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HUMAN ENGINEERING BIBLIOGRAPHY

1958 — 1959

Prepared by

THE PROJECT STAFF

HUMAN ENGINEERING INFORMATION AND ANALYSIS SERVICE

Institute for Applied Experimental Psychology
Tufts University

XEROX

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OCTOBER 1960



OFFICE OF NAVAL RESEARCH
DEPARTMENT OF THE NAVY
Washington, D.C.

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OFFICE OF SCIENTIFIC RESEARCH
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DEPARTMENT OF THE ARMY

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Washington, D.C.

Previous Bibliographies in this Series

* * * * *

"Human Engineering Bibliography, 1955-1956," prepared by The Project Staff, Human Engineering Information and Analysis Service, Tufts University, October 1957, Office of Naval Research Report ACR-24; Office of Technical Services, Department of Commerce, PB 131507 (\$4.75); ASTIA (AD-149950).

"Human Engineering Bibliography, 1956-1957," prepared by The Project Staff, Human Engineering Information and Analysis Service, Tufts University, October 1958, Office of Naval Research Report ACR-32; Office of Technical Services, Department of Commerce, PB 131507S (\$5.00); ASTIA (AD-205931).

"Human Engineering Bibliography, 1957-1958," prepared by The Project Staff, Human Engineering Information and Analysis Service, Tufts University, October 1959, Office of Naval Research Report ACR-43; Office of Technical Services, Department of Commerce, PB 161125 (\$5.00); ASTIA (AD-235970).

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PREFACE

The general objective of the contract under which the present report was prepared is to conduct long term research required to develop an Information Analysis Service in the area of Human Engineering designed to meet the needs of individuals responsible for the development of equipment operated by military personnel. One method for partially meeting this objective is to prepare and disseminate useful bibliographies. The present bibliography is one of a series which, it is hoped, meets the criterion of utility.

ACKNOWLEDGMENTS

A compilation of published literature into a bibliographic system and repository is of necessity the cooperative effort of many individuals, agencies, and institutions. The present effort is no exception and the project staff gratefully acknowledges the exceptional aid and support it has received from the personnel of the Institute for Applied Experimental Psychology, the Office of Naval Research, and the Armed Services Technical Information Agency. In addition, the following libraries were most helpful in making their facilities available to the project staff: Boston Medical Library, Boston Public Library, the several libraries at Harvard University and Massachusetts Institute of Technology, and the Eaton and Medical School Libraries at Tufts University.

Gratitude is extended to the many authors and publishers who have made it possible for the project to acquire reprints and microfilm copies of materials for inclusion in the project's files.

Finally, the project staff wishes to extend its gratitude to Dr. Ezra V. Saul, who served as consultant for the project. His years of experience with the project since its inception proved a valuable asset in the completion of the present report.

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INTRODUCTION

PURPOSE AND SCOPE OF THE BIBLIOGRAPHY

Personnel responsible for the human factors considerations in the design and development of equipment have a major need for rapid and easy access to the literature pertinent to their work. The fact that the literature associated with human engineering derives from several hundred different journals and periodicals as well as a host of publications from governmental, industrial, and academic laboratories presents a compelling requirement for the development of useful bibliographic aids. The present bibliography is one of a planned series of annual bibliographies¹ of literature pertinent to human engineering, which has been designed to meet this requirement.

The scope and character of the present bibliography was influenced by two major considerations. The first related to the question of maximizing use of the bibliography in terms of ease and accuracy. The second consideration related to the selection of references as contents of the bibliography.

Recommendations and solutions relating to the design of the bibliography for facile use derived primarily from a report² which summarized an extensive study of bibliographic systems which might be used for human engineering literature. Specific features of the present bibliography which follow the recommendations of the report are the "Topical Outline of the Literature in Human Engineering" (Part I), the "Alphabetical Index to the Human Engineering Literature" (Part III), and the form and content of "Citations and Abstracts" (Part IV).

¹Earlier bibliographies were submitted for publication to the U.S. Naval Training Device Center, Port Washington, Long Island, New York. The first bibliography ("Human Engineering Bibliography, 1955-1956," ONR Report ACR-24) in this series contains references primarily from the 1955-1956 publication period and was published October 1957 by the Office of Naval Research, Department of the Navy, Washington, D.C. The second bibliography ("Human Engineering Bibliography, 1956-1957," ONR Report ACR-32) in this series contains references primarily from the 1956-1957 publication period and was published in October, 1958, by the Office of Naval Research, Department of the Navy, Washington, D.C. The third bibliography ("Human Engineering Bibliography, 1957-1958," ONR Report ACR-43) in this series contains references primarily from the 1957-1958 publication period and was published in October, 1959, by the Office of Naval Research, Department of the Navy, Washington, D.C.

²D.B. Devoe, Ann Solomon, and E.V. Saul, "A Proposed System for Bibliographic Services in Human Engineering," Contract Nonr 494(09), Tufts University Report submitted to Special Devices Center, Office of Naval Research, May 1955, 15 pp. and appendices.

Regarding the selection of references for inclusion in the present bibliography, the project staff was influenced by several considerations. For one, the staff reviewed the interest and preoccupation of human engineers (as reflected in symposia, publications, etc.) and selected references to meet the broad spectrum of revealed interests. The validity of these choices has been partially assessed upon the basis of user reaction to the previously published bibliographies. A second consideration in the selection of references was the decision that the document had to be available to the project staff for detailed examination prior to coding and abstracting. This meant, for the most part, that if the document was not among the acquisitions of the project it would not be included in the bibliography. However, since the acquisition of documents pertinent to human engineering is a major effort of the project, most documents will be referenced in these annual bibliographies over a period of years. The final major consideration was that, insofar as possible, the selected references for the present bibliography be from the publication period January 1958 to December 1959.¹ This requirement was modified to permit the inclusion of a moderate number of documents from earlier publication periods, which had only recently been acquired and which were judged especially relevant to human engineering.

In summation, then, the purpose of the present bibliography is to provide a useful compilation of references to the human engineering literature which reflects the most current acquisitions of the Human Engineering Information and Analysis Service, Tufts University.

INSTRUCTIONS AND ILLUSTRATIONS IN THE USE OF THE PRESENT BIBLIOGRAPHY

The search for and location of references on a specific topic may proceed in three ways.

(1) The user should examine the categories in the "Topical Outline of the Literature in Human Engineering" (Part I), noting the Code Category Numbers of those categories deemed pertinent to his problem. He should then locate these Numbers in the "Facsimile of Subject Matter Files" (Part II) and note the listed Accession Numbers. Finally, he should locate these Accession Numbers in the list of "Citations and Abstracts" (Part IV).

(2) The user should examine the contents of the "Alphabetical Index to the Human Engineering Literature" (Part III) for terms which are descriptive of or synonymous with his problem and note the Code Category Numbers and corresponding pages under which such material has been coded. He should then check the content description of these categories in Part I, then proceed to obtain the Accession Numbers for the selected

¹Since a number of documents published during this period were not available for examination by the coding staff, they are not cited in the present bibliography. However, most of them should become available during the coming year and will probably be part of successive bibliographies of the present project, i.e., each successive bibliography in the series will attempt to include the citations which were not included in the previous publication.

categories in Part II, and, finally, examine the citations and abstracts in Part IV.

(3) The user wishing to retrieve the citations of work by a particular author should examine the "Author Index" (Part V) and note the Accession Numbers following the author's name. He should then locate these Numbers in Part IV.

In general, users of Part I should routinely search the Bibliographies and General References categories (1.1.0, 2.1.0, 3.1.0, 4.1.0, 5.1.0, 5.2.0, 5.3.0, 5.4.0, 5.5.0, 6.1.0, 7.1.0, 8.1.0, 9.1.0, 10.1.0, 11.1.0, 12.1.0, 13.1.0, 14.1.0) in addition to the specific topic categories relevant to their problem. Likewise, if the topic categories of interest are subordinate to some categories in Part I, the supraordinate category should be searched, since articles cross-cutting several subordinate categories were frequently classified in the related supraordinate category. In addition, the user should examine the references in the frequently cross-referenced categories.

It is recognized that the suggested procedures for the use of the present bibliography tend to force the user to work through Part I and Part II. Though more direct retrieval procedures are possible, those which are suggested tend to insure that the user will obtain an overview of all the subject matter categories and perceive the functional relationship among spatially proximal categories.

Illustrative Search Problem A

Given the need for information pertinent to the design of bearing scales for use with a radarscope, the user would examine Part I and discover that category 3.5.2 (Range and bearing scales and aids) was relevant to his problem. He should also note the category 3.5.0 (Radarscopes and other cathode-ray-tube displays) was supraordinate to 3.5.2 and deduce that information pertinent to his problem might be found in this category. The user should also note the cross-referenced categories of 3.6.0, 3.15.0, and 7.7.2. Finally, the user should plan to examine the category 3.1.0 (Bibliographies and general references pertinent to visual inputs and processes). Having decided that the above indicated categories are pertinent to the problem, the user would then obtain the Accession Numbers opposite these Code Category Numbers in Part II and then look up the Accession Numbers in Part IV.

Illustrative Search Problem B

Given the need for information pertinent to the design of bearing scales for use with a radarscope, the user would turn to Part III and locate such terms as "Bearing information aids," "Bearing information scales," "Radar," etc., and note the Code Category Numbers - 3.5.2 and 3.5.0 - and their corresponding pages in Part I. The user should then verify the codes by referring to Part I and then look up the categories in Part II for the Accession Numbers, which will refer him to appropriate entries in Part IV.

PART I

TOPICAL OUTLINE OF THE LITERATURE IN HUMAN ENGINEERING

The Topical Outline of the Literature in Human Engineering (T.O.) which appears on the succeeding pages is a reflection of many considerations. It is the project staff's best estimate of a functional organization of topic headings pertinent to human engineering. The topic headings represent an appropriate description of the published literature as it became available to the project staff. As has the present outline, future forms of the T.O. are expected to reflect both user reaction and publication trends.

In the past it has been customary to reflect code category changes that have occurred between the new bibliography and that of previous years. This practice has been discontinued this year. Some code categories which appear in the first three editions of the T.O. have been deleted and their material subsumed under more appropriate headings. Other categories have been expanded; new categories have been added. This has resulted in such circumstances as code numbers (7.6.6, etc.) being assigned to different categories from one year to the next. Rather than possibly confusing the reader by attempting to relate the accumulated changes, it is recommended that the user approach each T.O. as an independent unit whose relation to preceding outlines is historical but not necessarily functional. Each new topical outline supersedes all previous ones.

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Topical Outline of the Literature in Human Engineering

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TOPICAL OUTLINE OF THE LITERATURE IN HUMAN ENGINEERING

1.0.0 HUMAN ENGINEERING: METHODS, FACILITIES, EQUIPMENT, AND GENERAL REFERENCES.

This section includes general or heterogeneous texts, review articles, etc., on human engineering; discussion and information concerning methods and apparatus used in human engineering research; descriptions of agencies, institutions, and facilities engaged in human engineering research and application.

References to specific aspects of human engineering such as vision, audition, etc. may be found in the appropriately designated sections of the outline, e.g., for special references and bibliographies on vision, see code 3.1.0.

1.1.0 GENERAL AND COMPREHENSIVE REFERENCES IN HUMAN ENGINEERING - texts, handbooks, articles, and heterogeneous bibliographies that are relevant to several phases of human engineering.

1.2.0 METHODS, EXPERIMENTAL DESIGN, AND PROCEDURES USED TO OBTAIN AND TREAT INFORMATION PERTINENT TO HUMAN ENGINEERING - in general, specific data obtained by way of the indicated methods are not included here but under other relevant sections of the outline.

1.2.1 Mathematical and Statistical Methods - quantitative techniques for the description and treatment of data, e.g., correlational techniques, non-parametric statistics, mathematical models, Monte Carlo techniques, stochastic formulations. For use of these techniques in systems analysis see 2.2.0.

1.2.2 Methods of Task and Personnel Description and Assessment - techniques designed to evaluate various processes in the total task, e.g., job analysis, time and motion studies; also proficiency testing, requirement setting.

1.2.3 Psychophysical Methods - includes methods such as constant stimuli, limits, etc., and the construction of scales and/or techniques to determine psychophysical thresholds, e.g., scales of sensation.

1.2.4 Physiological Methods - includes those with general utility for human engineering problems. For other specific methods see 7.5.1, 12.9.0.

1.2.5 Special Techniques - those techniques and methods not defined by the above sections, e.g., critical incident techniques, and interview methods.

- 1.3.0 EQUIPMENT AND APPARATUS USED PRIMARILY IN HUMAN ENGINEERING RESEARCH - includes general equipment applicable to several phases of human engineering research. Information concerning equipment specifically designated for use with problems in the areas included in this outline may be found by reference to the particular equipment category in that section; e.g., vision (3.16.0), audition (4.9.12), touch (5.1.4), temperature (5.2.2), pain (5.3.2), smell and taste (5.4.3), kinesthesia (5.5.3), vestibular functions (5.6.2), anthropometry (7.4.0), motor performance (7.6.7, 7.7.4), clothing and personal equipment (11.8.0), special environmental effects (12.9.0).
- 1.4.0 FACILITIES IN HUMAN ENGINEERING - installations, agencies, and organizations whose objectives, organization, and facilities are concerned with human engineering research and application.

2.0.0 SYSTEMS OF MEN AND MACHINES

Materials and references regarding the behavior of men in interaction with men and machines and acting as integrated systems are included here. In general, information pertaining to a specific man-machine interaction may be found elsewhere in the topical outline.

- 2.1.0 BIBLIOGRAPHIES AND GENERAL WORKS ON SYSTEMS OF MEN AND MACHINES AND THEIR COMPONENTS - includes definitions of operations and systems research as well as descriptions of origin of the fields, scope of the fields, and processes involved.
- 2.2.0 TECHNIQUES FOR THE DESIGN AND EVALUATION OF SYSTEMS AND OPERATIONS - operations and systems research methods in general. For pre-established methods such as statistics, probability theory, cybernetics, and other psychological methods consult 1.2.0.
 - 2.2.1 Communication and Information Theory - includes basic concepts and theoretical discussions of man as a link in communication systems.
 - 2.2.2 Game or Decision Theory and Linear Programming.
 - 2.2.3 Computers and Simulation - analog and digital computers, simulation techniques, etc.
 - 2.2.4 Queueing Theory and Work Measurement Techniques.
- 2.3.0 RESEARCH AND EVALUATION OF SYSTEMS - contains information and data on systems components, systems processes and specific systems (their design and functional efficiency) not elaborated below. Personnel selection and proficiency tests are included under specific system categories below. See also 15.1.0.
 - 2.3.1 Assignment of Functions to Men or Machines - contains material on man as a system component with practically oriented studies on reception of information, processing information, and transmission of information. For tracking see 7.7.2; for watchkeeping see 7.7.1.
 - 2.3.2 Groups as System Components - performance as a function of group structure, task, and interpersonal factors, e.g., leadership, crew assembly, problem solving, work organization and layout (15.2.0).
 - 2.3.3 Communications Systems - includes variables important in communication and evaluations of specific communication systems. For information on components of auditory and speech systems see 4.3.0, 4.4.0, 4.5.0.

- 2.3.4 Transportation Systems - includes weapon systems such as aircraft and missiles, ground transportation systems, and ocean transportation systems. For evaluation of components see 10.10.2, 10.10.3, 10.10.4.
- 2.3.5 Production Maintenance and Supply Systems - for evaluation of components see 10.10.0; for maintenance design factors see 10.7.0.
- 2.3.6 Air Traffic Control System - includes history of the problem and evaluation of equipment and operational variables.

3.0.0 VISUAL INPUTS AND PROCESSES

References on basic visual data related to the design and use of equipment, problems of natural and artificial lighting, specific visual displays, and equipment and methods for basic and applied problems in vision are included.

- 3.1.0 BIBLIOGRAPHIES AND GENERAL REFERENCES PERTINENT TO VISUAL INPUTS AND PROCESSES.
- 3.2.0 NATURAL AMBIENT LIGHTING - includes general methods of measurement, effects on visual detection, visual range, and other visual tasks; excludes basic visual data (3.15.0).
 - 3.2.1 Daytime Light - includes indoor and outdoor situations, object color and visibility. For visibility and design of work space see 10.2.1.
 - 3.2.2 Twilight and Night - includes indoor and outdoor situations where this is one of the major variables being studied, night visual efficiency, and factors affecting night vision.
 - 3.2.3 Special Conditions Affecting Visibility - includes haze, fog, precipitation, light at high altitudes, and visibility of submerged objects.
 - 3.2.4 Glare - includes direct sunglare and reflected glare from clouds, moisture particles, or other objects as it affects vision; excludes glare factors of artificial illumination (3.3.4).
- 3.3.0 ARTIFICIAL AMBIENT LIGHTING - includes general discussions of illumination problems, methods of measurement, and effects on visual tasks; excludes basic visual data (3.15.0) and instrument lighting (3.4.0).
 - 3.3.1 Considerations of Illumination - includes effect of varied intensity levels on performance of visual tasks, preferences and recommendations for intensity levels for various types of visual tasks, and uniformity and color of illumination and surrounds. For illumination and work space design factors see 10.2.1.
 - 3.3.2 Lighting Systems, Outdoor - includes such systems as highways, landing fields, and their effects on visibility; also local lighting such as car lights and exterior aircraft lights. For light coding see 3.12.2.
 - 3.3.3 Lighting Systems, Indoor - includes descriptions and specifications for such systems as school rooms, workrooms, factories; excludes lighting of instruments and equipments (3.4.0, 3.5.0, 3.6.0).
 - 3.3.4 Unusual Characteristics of Artificial Illumination Affecting Visual Performance - includes glare, flicker, polarization, and inversion of illumination pattern.

- 3.4.0 LIGHTING OF INSTRUMENTS - includes the effect on visibility of lighting systems specifically oriented to a work place of dials and instruments as in aircraft or submarines; excludes legibility of letters, numerals, and symbols (3.9.0).
 - 3.4.1 Direct Lighting and Floodlighting - includes descriptions, effects on visibility, mechanical efficiency, and maintenance.
 - 3.4.2 Indirect Lighting - Edge, Ring, Rear (Transillumination), etc. - descriptions, effects on visibility, mechanical efficiency, and maintenance.
 - 3.4.3 Color and Intensity of Illumination - includes red and ultra-violet lighting systems as they affect operator efficiency, intensity levels, and contrast.
 - 3.4.4 Comparisons of Methods and Types of Instrument Lighting - includes human engineering evaluations of such lighting systems.
- 3.5.0 RADARSCOPES AND OTHER CATHODE-RAY TUBE DISPLAYS - includes analyses and reviews of problems of radar visibility, radarscope interpretation as dependent on the interactions between the physical characteristics of the equipment and observer variables, and other types of CRT displays; excludes television (3.6.0) and basic visual data (3.15.0).
 - 3.5.1 Physical Characteristics of Radar Equipment Displays Affecting Signal Detectability - includes types of displays, comparisons of types, electrical parameters affecting detectability, screen and pip brightness, uniformity of screen brightness, visual noise background, size, shape, location and other characteristics of the signal.
 - 3.5.2 Range and Bearing Scales and Aids - includes grids, range rings, cursors, counters, and other devices used to obtain range and bearing information. For tracking see 7.7.2.
 - 3.5.3 Radar Screen Size, Shape, and Orientation; Ambient Lighting Conditions - includes external physical variables of the equipment, angle of mounting and of viewing, intensity and color of room illumination. For general considerations of illumination see 3.3.1.
- 3.6.0 TELEVISION AND MOTION PICTURE DISPLAYS - includes physical characteristics as they affect visibility of display, physical viewing conditions, and perceptual factors; excludes basic visual data (3.15.0).
- 3.7.0 PICTORIAL AND SYMBOLIC DISPLAYS - includes the general area of visibility and/or legibility of displays that utilize picture and sign-like representations of a given situation; excludes legibility (3.9.0), indicators and scales (3.8.0), and printed materials (3.10.0).
 - 3.7.1 Outside-in and Inside-out Displays - the portrayal of a situation as it would look to an observer external to it (plot board in combat information center), or within it (attitude indicators in which horizon tilts and aircraft remains stationary); includes descriptions, principles of design, and evaluations.
 - 3.7.2 Combining Pictorial and Symbolic Display Elements - includes descriptions and evaluations.
 - 3.7.3 Evaluation and Comparison Among Types of Pictorial and Symbolic Visual Displays - includes pictorial versus symbolic displays, outside-in versus inside-out displays, and comparisons within a type of display.

- 3.8.0 INDICATORS AND SCALES - includes tests on performance of various types of indicators and scales when used individually or in combination (e.g., scale on radar or aircraft); also includes general design principles. For factors of lighting see 3.4.0; of legibility see 3.9.0.
- 3.8.1 Indicators - includes kind of information best presented, amount of detail, design factors such as direction of numeral movement, optimum number of numerals, use of zeros, and size.
- 3.8.2 Pointers - includes design factors such as length, shape, and width.
- 3.8.3 Scales: Shape, Size, and Direction of Increase - includes horizontal, vertical, or circular scales, dial diameter, and the kind of information best presented by each.
- 3.8.4 Scales: Divisions and Markings - includes the number of divisions necessary to present information adequately, size of space between divisions, number and width of markings, scale break, scale origin, and labelling.
- 3.8.5 Design of Scales for Qualitative Readings - includes orientation of pointer, size, and grouping of scales (see 9.4.0 and 9.5.0 for layout problems); visual monitoring of multiple dials. For individual and systems problems in monitoring see 2.3.1, 4.7.0, 13.2.4.
- 3.8.6 Evaluation and Comparison of Indicators and Scales - includes dials versus counters, moving pointer versus moving dial, and other comparisons.
- 3.9.0 LEGIBILITY OF LETTERS, NUMERALS, AND OTHER SYMBOLIC FORMS - includes general information concerning design and recognition of code symbols, silhouettes, and other symbolic forms; excludes visual coding (3.12.0). See also acuity (3.15.6), form perception (3.15.10), printed material (3.10.0).
- 3.9.1 Design of Characters - includes form, type face, size, stroke-width, and spacing between characters and between lines.
- 3.9.2 Color and Contrast Between Symbol and Background - includes color of symbol and of background, brightness relations, and their effects on legibility. See also color discrimination (3.15.4), brightness contrast (3.15.5).
- 3.9.3 Viewing Conditions - includes factors pertaining to the task and its environment such as exposure time, illumination (3.3.0), distance, vibration, and viewing angle (13.14.0).
- 3.10.0 PRINTED MATERIALS - includes information concerning the design, readability, and application of graphic displays.
- 3.10.1 Graphs and Tables - includes design factors such as amount of detail, arrangement, length, kinds of information and their influence on operator performance.
- 3.10.2 Maps and Charts - design factors such as color, contrast, symbols, amount of detail and their influence on operator performance.
- 3.10.3 Signals, Instruction Cards, Check Lists, Labels, Instruction Charts - includes descriptions and evaluations.
- 3.10.4 Evaluation and Comparison of Types of Printed Materials - includes efficiency of information presentation of maps versus charts, graphs versus tables.

- 3.10.5 Photography and Photo-interpretation - includes techniques of analysis and interpretations of various types of photography such as aerial and X-ray.
- 3.11.0 CAMOUFLAGE OR CONCEALMENT - includes the integration of equipment or landscape with the general background.
- 3.12.0 VISUAL CODING - includes problems in using one or more of the visual characteristics of an object to differentiate it from other objects or from the background (3.11.0), and optical surveillance (3.2.0, 3.14.0). For basic visual data see 3.15.0.
 - 3.12.1 Object Characteristics - includes color, brightness, area, shape, texture, visual number, and data on the discriminability of these characteristics; descriptions and evaluations of standard safety color codes and coding for other purposes.
 - 3.12.2 Light Coding - includes warning and signal lights and such characteristics as color, brightness, position, and temporal characteristics (blinking) and their effects on discriminability; specific systems such as Navy signal lights and industrial lights with specifications for filters.
- 3.13.0 OPTICAL AIDS - includes information concerning the effect of optical equipment on visual performance; excludes manufacturing problems and basic visual data (3.15.0).
 - 3.13.1 Devices for Visual Enhancement - sights, reticles, binoculars, periscopes; design factors, methods of use, and effects on visual performance.
 - 3.13.2 Protective Devices - filters, special glasses, goggles, visors; transmission requirements; design requirements, uses, and effects on visual performance.
- 3.14.0 OTHER FACTORS AFFECTING VISUAL PERFORMANCE - includes size of visual field; restriction of visual field, e.g., by unusual position of viewer or design of equipment; visual noise; visual fatigue; and temporal factors. For restrictions due to work space design see 10.2.1; for other types of fatigue see 13.3.3.
- 3.15.0 BASIC VISUAL DATA RELATED TO THE DESIGN AND USE OF EQUIPMENT - includes general reviews of sensory and perceptual studies, pertinent theoretical formulations.
 - 3.15.1 Individual Differences and Anomalies - includes presbyopia, population differences, color deficiencies, monocular vision, night blindness, and other common deviations.
 - 3.15.2 Threshold Visibility - includes absolute thresholds for sensitivity to light (luminosity curves), and other thresholds dependent upon recognition of an object being "there" or "not there."
 - 3.15.3 Adaptation, Pre-adaptation, and Pre-exposure - includes visual thresholds during the course of light, dark, or chromatic adaptation and the effect of conditions preceding measurement upon the course of adaptation, such as intensity and duration of pre-adaptation light, exposure to bright sunlight or instrument lights.
 - 3.15.4 Perception of Color - includes thresholds for the discrimination of color (aperture, illuminant, object), and factors pertaining to the physical stimulus, the eye, or the observer that influence performance, e.g., color preference, and constancy. For color vision tests see 3.15.1.

- 3.15.5 Brightness Discrimination - includes thresholds for contrast sensitivity, contrast ratios, and factors of the physical stimulus, of eye, and of the observer that affect discrimination.
- 3.15.6 Acuity - includes vernier, stereoscopic, and dynamic acuity and factors of the physical stimulus, of the retina, and of the observer that affect performance.
- 3.15.7 Special Effects Dependent Upon Fixation or Exposure Time - includes flicker, figural after-effects, and after-images. For visual factors in spatial orientation see 6.3.2.
- 3.15.8 Eye Movements - includes type of movement, amount and direction during given visual tasks, and effects on visual performance.
- 3.15.9 Perception of Depth, Distance, and Size - includes measurements of thresholds, influence of monocular and binocular factors (including accommodation and convergence), stereoscopic vision, perception of the median plane, relation of size and depth factors, real and apparent size, brightness constancy, and effect of past experience. For clinical tests see 3.16.2.
- 3.15.10 Perception of Form, Contour, and Pattern - includes visual recognition thresholds, effect of meaningfulness, completeness of detail, and word recognition.
- 3.15.11 Perception of number, angle, and direction - includes counting, estimation, span of apprehension, estimation of angular bearing and/or direction of objects, and anchoring effects.
- 3.15.12 Perception of Movement - includes real and apparent motion, and autokinetic effects.
- 3.16.0 EQUIPMENT AND METHODS FOR BASIC AND APPLIED PROBLEMS IN VISION - includes descriptions, evaluations, and comparisons of visual equipment.
- 3.16.1 Tests of Color Vision - includes pseudo-isochromatic color plates, anomaloscopes, and color lanterns.
- 3.16.2 Other Tests of Visual Performance - includes tests of acuity, night vision, and depth perception.
- 3.16.3 Equipment and Methods for Basic Visual Research Problems - includes measurement and specification of visual stimuli as well as the respective equipments used, e.g., photometry, colorimetry, and other threshold methods. Subjective scaling techniques are also included.
- 3.16.4 Simulators for Specific Applied Problems - includes classroom demonstrators, radar, flight, and night vision trainers. For night vision training see 14.1.0.

4.0.0 AUDITORY INPUT AND PROCESSES, INCLUDING SPEECH PRODUCTION AND INTELLIGIBILITY

References on ambient noise, effects of auditory equipment and components, evaluations of auditory displays, speech communications, auditory presentation of information, and basic data in auditory processes are included.

- 4.1.0 BIBLIOGRAPHIES AND GENERAL REFERENCES PERTINENT TO AUDITORY INPUTS AND PROCESSES.
- 4.2.0 AMBIENT NOISE - includes the measurement and classification of noise-fields and their effects on the human operator; excludes channel noise (4.8.3) and basic psychophysical data on noise stimuli.

- 4.2.1 Measurement of Noise Level and Composition - includes spectral analysis, critical band analysis, autocorrelation functions, etc.
- 4.2.2 Noise Reduction and Control - includes hearing conservation programs, noise-reducing devices, acoustic shielding, and standards of noise level tolerance; excludes personal equipment, e.g., ear-plugs or helmets (11.3.3, 11.5.1).
- 4.2.3 General Industrial and Equipment Noise - includes vehicle noise, street noise, and machine noise not included under 4.2.4 and 4.2.5.
- 4.2.4 Aircraft and Weapons Noise - includes noise-fields of propeller-driven planes, jet engines, rockets, gunfire, helicopters, guided missiles, etc., including simulated aircraft noise.
- 4.2.5 Submarine and Ship Noise - includes engine noise, air conditioner unit noise, etc.
- 4.2.6 Effects of Ambient Noise and Blast on Performance - includes the effects of noise-fields and blast on performance, industrial efficiency, accident rates, etc. See 4.8.3 for the effects of noise on speech production, and 4.2.7 for hearing-loss effects of noise.
- 4.2.7 Noise-induced Hearing Loss - includes long-term hearing-loss resulting from noise and blast exposure, e.g., aviation deafness, industrial deafness, "boiler-maker's ear," etc.; excludes transient effects, e.g., post-stimulatory threshold shifts that are primarily produced under experimental laboratory conditions (4.9.5). (Since many of these laboratory effects are relevant and may persist under some conditions, however, 4.9.5 should also be consulted.)
- 4.3.0 EFFECTS OF AUDITORY EQUIPMENT COMPONENTS - includes comparisons of different system components in communication systems and auditory displays, e.g., comparative ratings of different earphones in an aviation intercom system; excludes comparisons of complete systems (2.3.3, 4.5.0).
 - 4.3.1 Input Devices - includes microphones, vibration pickups, etc.
 - 4.3.2 Transmission Devices - includes amplifiers and attenuators, filters, expanders and limiters, frequency modulators, multipliers and dividers, interrupters, scramblers, delay lines, etc. For the effects of such devices on speech see 4.8.4.
 - 4.3.3 Output Devices - includes loudspeaker, earphones, and hearing aids.
- 4.4.0 EVALUATIONS OF SPECIFIC SYSTEMS IN SPEECH COMMUNICATION - includes the effects of specific systems rather than of speaking or listening habits, etc.; excludes effects of system components (2.3.3, 4.3.0).
 - 4.4.1 Telephone and Intercom Systems - includes comparison of different intercom systems, e.g., aviation, ship, and multi-channel intercom systems.
 - 4.4.2 Radio Systems - includes comparisons of various radio systems for control towers, aircraft, etc.
- 4.5.0 EVALUATIONS OF SPECIFIC SYSTEMS IN NON-VERBAL AUDITORY DISPLAY - includes the effects of specific systems rather than listening habits, etc.; excludes effects of system components (2.3.3, 4.3.0).
 - 4.5.1 Intermittent Warning and Signaling Devices - includes sirens, bells, radio range, Geiger counters, clicks, etc.

- 4.5.2 Telegraphic Systems.
- 4.5.3 Sonar and Other Underwater Sound Systems - excludes the effects of sonar training (14.1.0) or individual differences in skill (4.7.0).
- 4.5.4 Flybar - includes comparisons of auditory flight guidance systems.
- 4.6.0 CHARACTERISTICS OF AUDITORY SIGNALS IN RELATION TO CODING - includes the relation of the stimulus properties in non-verbal auditory signals to coding efficiency, channel capacity, and related problems, e.g., the determination of the maximum number of pitches giving reliable pitch coding results. See also 4.9.1, 4.9.2, 4.9.3, 4.9.8.
- 4.7.0 SPECIAL AUDITORY SKILLS - includes the effects of external stimulus conditions, practice, and individual differences as they affect specific auditory skills, e.g., in sonar listening, auditory search, and monitoring (2.3.1, 3.8.5, 13.2.4).
- 4.8.0 BASIC DATA IN THE PRODUCTION AND PERCEPTION OF SPEECH - includes systematic considerations of speech communication as well as general articles, symposia, etc., in speech communication.
 - 4.8.1 Basic Characteristics of Speech - includes speech spectra, phonetic analysis, phonemic analysis, formants, etc.
 - 4.8.2 Speech Audiometry and Articulation Testing - includes measures of of articulation, speech thresholds, and hearing loss for speech; excludes audiometry with non-verbal stimuli (4.2.7, 4.9.4).
 - 4.8.3 Speech Masking and the Signal-to-noise Ratio - includes the effects of masking with noise, pure tones, and simultaneous speech on the production and intelligibility of speech.
 - 4.8.4 Speech Distortion - includes the effects on speech intelligibility of clipping, chopping, amplitude modulation, frequency distortion, delay distortion, compression and expansion, etc.
 - 4.8.5 Individual Differences and Anomalies in Listening, Speaking, and Interpreting - includes selective listening, emotional over-lay, speaker intelligibility differences as a function of nationality, sex, speech impediment, etc. See 4.2.7 for characteristics of the deaf.
 - 4.8.6 Language Design - includes the formation of articulation and speech audiometry test materials, control tower language, "highly audible phrases," "competitive context," the NATO phonetic alphabet, mechanized translation, etc.
- For Training in Voice Communication - see 14.1.0.
- 4.8.7 Synthetic Speech - includes the use of synthetic speech in experimental phonetics, speech audiometry, and band width compression.
- 4.9.0 BASIC DATA IN AUDITION - excludes basic speech data (4.8.0).
 - 4.9.1 Basic Attributes: Pitch - includes pitch of pure and complex tones and noises, absolute pitch, diplacusis, tonal gaps, etc.
 - 4.9.2 Basic Attributes: Loudness - includes loudness of pure and complex tones and atonal stimuli, recruitment phenomena, loudness of monaural and binaural stimulation, etc.

- 4.9.3 Basic Attributes: Timbre, Duration, and Other Qualities - includes volume, density, brightness, and vocality.
- 4.9.4 Thresholds and Related Phenomena - includes absolute, differential, and masked thresholds for tonal and noise stimuli, including pure-tone audiometry; excludes changes in the threshold: as a result of prior stimulation (4.9.5), speech audiometry, and speech detection thresholds (4.8.2).
- 4.9.5 After-effects of Stimulation - includes auditory fatigue, threshold recovery, tinnitus, pitch shifts, time errors, etc.; excludes permanent or long-term effects (4.2.7).
- 4.9.6 Stimulus Mixture - includes beats, aural harmonics, combination tones, modulation, complex tones, Tartini tones, etc.
- 4.9.7 Sound Localization - includes effects of interaural time and intensity differences, monaural cues, effects of non-auditory cues, stereophonic sound (auditory perspective), and obstacle avoidance.
- 4.9.8 Auditory Patterns and Meaning - includes discrimination of flutter, temporal patterns, melody recognition, micro-melodies, artificial meaning of melodic patterns, etc. (4.6.0, 4.9.4).
- 4.9.9 Psychological Scaling - includes the use of subjective scales (e.g., sone and mel scales) and their construction by means of interval scaling, ratio scaling, etc. (1.2.3, 4.9.12).
- 4.9.10 Norms, Individual Differences and Anomalies in Basic Auditory Performance - includes presbycusis, population differences, etc. (4.2.7, 4.9.4).
- For Non-verbal Auditory Training - see 14.1.0.
- 4.9.11 Physiological Mechanisms - includes basic data on human auditory physiological mechanisms; excludes all animal studies save those pertinent to human physiological problems, e.g., experimentally induced deafness from very high-energy noise-fields.
- 4.9.12 Equipment and Methods Used in Research in Audition and Speech - includes audiometric devices, techniques of audiometry, Vocoder, etc.

5.0.0 OTHER SENSORY INPUTS AND PROCESSES

References on sensory inputs other than vision and audition, including considerations of touch, kinesthesia, temperature sensitivity, smell, taste, pain, and the vestibular sense, may be found in this section.

- 5.1.0 TOUCH - general references and bibliographies.
 - 5.1.1 Basic Processes and Data - includes data on thresholds, acuity, adaptation, and individual differences.
 - 5.1.2 Tactile Coding - e.g., the discrimination of knob shapes, thicknesses, sizes, textures, knurling (8.4.0).
 - 5.1.3 Vibratory Stimuli Used as Signals and Displays - e.g., buzzer on hand.
 - 5.1.4 Equipment and Methods Used in Human Engineering Research on Touch.

- 5.2.0 TEMPERATURE SENSITIVITY - general references and bibliographies. For factors of thermal environment see 12.2.0, 12.2.1.
 - 5.2.1 Basic Processes and Data - includes data on thresholds, acuity, adaptation, and individual differences.
 - 5.2.2 Equipment and Methods Used in Human Engineering Research on Temperature Sensitivity.
- 5.3.0 PAIN - general references and bibliographies.
 - 5.3.1 Basic Processes and Data - includes data on thresholds, acuity, adaptation, individual differences.
 - 5.3.2 Equipment and Methods Used in Human Engineering Research in Pain.
- 5.4.0 SMELL AND TASTE - general references and bibliographies.
 - 5.4.1 Basic Processes and Data - includes data on thresholds, acuity, adaptation, individual differences, masking odors, and deodorizing.
 - 5.4.2 Olfactory and Gustatory Signals - e.g., smoke and noxious gases.
 - 5.4.3 Equipment and Methods Used in Human Engineering Research on Smell and Taste.
- 5.5.0 KINESTHESIS - general references and bibliographies.
 - 5.5.1 Basic Processes and Data - includes data on thresholds, acuity, adaptation, and individual differences.
 - 5.5.2 Coding and Signalling Through Kinesthesia - includes data on the use of feedback through the discrimination of control position and load (8.7.2), and discrimination through movement extents (7.6.1).
 - 5.5.3 Equipment and Methods Used in Human Engineering Research on Kinesthesia.
- 5.6.0 VESTIBULAR FUNCTIONS - general references and bibliographies.
 - 5.6.1 Basic Processes and Data - includes data on thresholds, adaptation, and individual differences.
 - 5.6.2 Equipment and Methods Used in Human Engineering Research on Vestibular Functions.
- 5.7.0 TIME PERCEPTION.

6.0.0 INPUT CHANNELS: CHOICE AND INTERACTION

References on intersensory effects of stimulation and comparisons of input channels are included.

- 6.1.0 BIBLIOGRAPHIES AND GENERAL REFERENCES PERTINENT TO CHOICE AND INTERACTION AMONG INPUT CHANNELS.
- 6.2.0 COMPARISON OF INPUT CHANNELS - includes range and resolution in different modalities, and other data relating to the choice of input channel.
 - 6.2.1 Comparisons of Visual and Auditory Channels - for basic visual and auditory data see 3.15.0, 4.9.0.
 - 6.2.2 Comparisons of Channels Other Than Visual and Auditory - for basic data see code categories in 5.0.0.

6.3.0 INTERSENSORY EFFECTS - includes the effects of stimulation in one modality on perception in another; excludes the effects of distracting or masking stimulation on performance.

6.3.1 Facilitation and Inhibition of Reception - includes data on stimulus compatibility.

6.3.2 Factors Determining Orientation in Space - includes the effects of visual, auditory and proprioceptive cues, perceptual illusions (3.15.7), and vertigo.

7.0.0 BODY MEASUREMENTS, BASIC PHYSIOLOGICAL CAPACITIES, BASIC AND COMPLEX MOTOR PERFORMANCE

Materials and references on basic motor activities, anthropometric measurements, norms and data on muscular strength, extent of human movement, and perceptual-motor skills may be found in this section.

7.1.0 BIBLIOGRAPHIES AND GENERAL REFERENCES PERTINENT TO BODY MEASUREMENTS AND BASIC MOTOR PERFORMANCE.

7.2.0 ANTHROPOMETRIC MEASUREMENTS - includes descriptive articles, studies of body gravity.

7.2.1 Body Size, Stationary - includes distributions of and norms for body dimensions, such as hip girth, stature, weight, head size, hand size, somatotypes.

7.2.2 Body Size in Motion or in Unusual Positions - includes measurements of the space required to perform various body movements or to assume unusual positions.

7.3.0 BODY MECHANICS - includes normative data on individual differences. For basic data on motor performance see 7.6.0.

7.3.1 Extent of Limb Movement - leg and arm reach, pace, length, etc.

7.3.2 Flexibility of Movement - includes flexibility of joints, fingers, trunk, or neck and various combinations.

7.3.3 Muscular Strength and Endurance - includes normative data on strength, endurance, steadiness, muscular potential, etc., of various limbs and combinations of limbs; also includes data on work capacity. For fatigue and work decrement see 13.3.3.

7.4.0 EQUIPMENT AND METHODS USED IN HUMAN ENGINEERING RESEARCH ON ANTHROPOMETRY BODY MECHANICS.

7.5.0 BASIC PHYSIOLOGICAL CAPACITIES - includes the assessment and definition of the human's structural capabilities and limits and individual differences in these capabilities, e.g., breathing rate, energy expenditure, basal metabolic rate, physical proficiency. See code categories in 12.0.0 for the effects of special environmental factors on these capacities.

7.5.1 Equipment and Methods Used in Research on Basic Physiological Capacities (1.2.4).

7.6.0 BASIC MOTOR PERFORMANCE - includes general analyses of movement classes or types, speed, and accuracy data. For data on body mechanics see 7.3.0.

7.6.1 Positioning Movements - includes bisecting movements and movement between markers and stoppers. See 5.5.2 for coding problems.

- 7.6.2 Repetitive and Rhythmic Movements - includes tapping, cranking, and movements in particular time and rate patterns.
- 7.6.3 Manual Dexterity - efficiency (smoothness) of performance; includes coordination of the two hands.
- 7.6.4 Reaction Time - includes simple and complex RTs for various modalities and factors affecting these times.
- 7.6.5 Handedness - includes distributions in the population and effects of handedness on performance.
- 7.6.6 Involuntary Reflexes - includes sneezing, blinking, tremor, and other somatic responses.
- 7.6.7 Equipment and Methods Used in Human Engineering Research on Basic Motor Performance.
- 7.7.0 COMPLEX MOTOR PERFORMANCE - includes general analyses of the processes involved as well as specific types of performance not elaborated below.
 - 7.7.1 Watchkeeping Performance - monitoring, vigilance tasks that require response to intermittently occurring signals, e.g., radar viewing (3.8.5), sonar listening (4.5.3).
 - 7.7.2 Tracking Performance - includes types of tracking and factors influencing performance. For studies dealing primarily with systems evaluation see 2.3.1; for design factors consult categories in 8.0.0.
 - 7.7.3 Serial Performance - includes serial movements, e.g., handwriting and sequentially ordered tasks such as those performed by the pilot in an approach landing, by the driver of an automobile, and in industrial assembly. Consult 13.4.0 for work conditions.
 - 7.7.4 Equipment and Methods in Human Engineering Research on Complex Motor Performance - includes psychomotor tests.

8.0.0 DESIGN OF CONTROLS AND INTEGRATION WITH DISPLAYS

References on the design and standardization of controls, integration of controls with displays, operation of controls, and time constants relevant to control operation are included.

- 8.1.0 BIBLIOGRAPHIES AND GENERAL REFERENCES PERTINENT TO DESIGN OF CONTROLS AND INTEGRATION WITH DISPLAYS - for visual factors consult the appropriate categories in 3.0.0; for motor performance factors see 7.0.0; for panel and console layout see 9.0.0.
- 8.2.0 STANDARDIZATION OF CONTROLS AND THEIR DISPLAYS AS IN DIFFERENT TYPES OF AIRCRAFT.
- 8.3.0 TYPES OF CONTROLS.
 - 8.3.1 Rotary Movement Controls - factors affecting design and selection of knobs, cranks, wheels, etc.
 - 8.3.2 Linear Movement Controls - factors affecting design and selection of levers and sticks, pushbuttons, pedals and rudder bars.
 - 8.3.3 Other Types of Controls - includes controls not designated above, e.g., handgrip controls. Also includes special types of unusual design, e.g., eye movement.

- 8.3.4 Multifunction Controls: Combined Controls - e.g., pushbutton on stick.
- 8.3.5 Comparisons Among Types of Controls: Choice of Type of Control - e.g., hand or foot, lever or stick.
- 8.4.0 CONTROL CODING - for the data in specific sensory areas see visual (3.12.0) auditory (4.6.0), tactual (5.1.2), kinesthetic (5.5.2).
 - 8.4.1 Multiple Dimensions - e.g., visual and tactual.
 - 8.4.2 Labelling - see 3.10.3 and 3.9.0 for visual factors of design and legibility.
- 8.5.0 POSITIONING AND PLANE OF OPERATION OF CONTROLS RELATIVE TO OPERATOR - for panels and consoles see 9.3.0.
- 8.6.0 SPECIAL CONSIDERATIONS RELATING TO PROLONGED ADJUSTMENT.
- 8.7.0 CONTROL DYNAMICS.
 - 8.7.1 Display-control Movement Ratios - gear ratios, coarse and fine tuning, gain, and attenuation.
 - 8.7.2 Control Loading - inertial, fractional, and elastic resistances.
 - For Human Reaction Times - see 7.6.4.
 - 8.7.3 Compatibility - direction and plane of motion of control and display element being controlled (3.8.5, 9.5.0), e.g., motion stereotypes, natural versus unnatural (7.6.0), continuous versus discontinuous.
 - For Tracking - see 7.7.2.
 - 8.7.4 Aided Controls - applications, effectiveness, aiding constants.
 - 8.7.5 Quickened Displays - applications, effectiveness, constants.

9.0.0 LAYOUT OF PANELS AND CONSOLES

In this section are included references on integrated groups of display-control units characterized by multiplicity of display-control operation.

- 9.1.0 BIBLIOGRAPHIES AND GENERAL REFERENCES PERTINENT TO INTEGRATED GROUPS OF DISPLAY-CONTROL UNITS (8.1.0).
- 9.2.0 STANDARDIZATION OF PANELS AND CONSOLES - for controls and displays see 8.2.0.
- 9.3.0 LOCATION OF PANEL RELATIVE TO OPERATOR AND TASK - includes angle of orientation and limits of working area on panels and consoles. Also consult 7.3.1, 10.2.2, 10.3.0, 10.6.0.
- 9.4.0 GROUPING OF COMPONENTS ON PANELS AND CONSOLES - includes data on location of components on consoles.
 - 9.4.1 Ease of Discrimination - for coding problems see 3.12.0, 5.5.2, 8.4.0.
 - 9.4.2 Spatial Dynamics - frequency and order of use. For eye movement data see 3.15.8.

- 9.5.0 SPECIFIC ORIENTATION OF PARTS - includes direction of movement of several indicators with respect to one another; excludes movement compatibility for a single indicator (8.7.3). For design data on these indicators see 3.8.5.

10.0.0 DESIGN OF WORK SPACE, EQUIPMENT, AND FURNITURE

References pertinent to the design of work space, equipment, and furniture as related to the requirements of complex motor coordination tasks and special clothing and personal equipment worn by the operator may be found here. Evaluations of special work places and equipment are also included.

- 10.1.0 BIBLIOGRAPHIES, GENERAL REFERENCES, AND TECHNIQUES OF ASSESSMENT PERTINENT TO THE DESIGN OF WORK SPACE, EQUIPMENT, AND FURNITURE.
- 10.2.0 WORKPLACE DESIGN - general design principles and criteria of work units as well as layout of larger work areas.
- 10.2.1 Visibility - field of view (3.14.0), location of critical task areas, obstacles and hazards, etc. For instrument lighting see 3.4.0; for indoor lighting systems see 3.3.3.
- 10.2.2 Ease and Speed of Movements - body clearance, distribution of equipment, location of tools, and reach distances (7.3.1, 9.3.0).
- 10.2.3 Stowage - arrangement of stored items for accessibility and space economy.
- 10.3.0 FURNITURE SPECIFICATIONS - in relation to anthropometric data (7.2.0, 7.3.0), the motor requirements of the task (7.6.0, 7.7.0), and arrangement (9.3.0).
- 10.3.1 Seating and Body Support - includes data on bunks, chairs, couches, ejection seats, body dimensions pertinent to seat design; excludes ejection capsule design (10.10.1). For effects of special clothing and equipment see 11.6.0.
- 10.3.2 Seating Arrangements.
- 10.3.3 Work Surfaces - includes data on desks, tables, benches, etc.
- 10.4.0 PASSAGEWAYS, ENTRANCES, AND EXITS - includes information on size and location in relation to anthropometric data (7.2.0), traffic, tasks, hazards, and escape. For effects of special clothing and equipment see 11.6.0.
- 10.5.0 TOOLS.
- 10.6.0 DESIGN FOR COMPLEX MOTOR COORDINATION TASKS AND SPECIAL BODY POSITIONS - e.g., loading gun inside tank; excludes performance data (7.7.0).
- 10.7.0 DESIGN FOR MAINTENANCE - e.g., accessibility, manipulability; excludes maintenance systems (2.3.5) and maintenance training (14.1.0).
- 10.8.0 DESIGN FOR PORTABILITY IN THE DESIGN OF EQUIPMENT - for specific portable equipments see 11.5.3, 11.5.4.
- 10.9.0 DESIGN FOR SAFETY - the role of human and situational factors in safety design and accident prevention and techniques of accident investigation. Includes studies on industrial safety and other types of safety not specified below.

- 10.9.1 Motor Vehicle Safety - includes studies on traffic and lighting problems (3.2.0, 3.3.2), safety aids (3.13.2, 11.3.1), accident proneness, accident investigation reports, and techniques of accident analysis, e.g., crash impact engineering (12.4.1). For driving as a serial task see 7.7.3; for transportation systems see 2.3.4.
- 10.9.2 Air Safety - aerial collision risk, accident proneness, techniques of accident investigation, and accident investigation reports. In addition to cross references listed under motor safety, consult 2.3.6 for air traffic control systems, 3.8.0 for individual instrument problems, and relevant categories in 12.0.0 for environmental factors.
- 10.10.0 HUMAN ENGINEERING DEVELOPMENT AND EVALUATION OF SPECIFIC WORK PLACES AND EQUIPMENTS NOT ELABORATED BELOW.
 - 10.10.1 Cockpits, Space Cabins, and Capsules.
 - 10.10.2 Aircraft - also includes airborne equipment and related ground equipment, e.g., maintenance stands, and storage systems.
 - 10.10.3 Sea and Landcraft - also includes related equipment.
 - 10.10.4 Fire Control (Weapons) Systems Equipment.
 - 10.10.5 Industrial Equipment.

11.0.0 CLOTHING AND PERSONAL EQUIPMENT

References on the design of clothing and personal equipment worn by the operator during the performance of a task are included.

- 11.1.0 BIBLIOGRAPHIES AND GENERAL REFERENCES PERTINENT TO THE DESIGN OF CLOTHING AND PERSONAL EQUIPMENT FOR PROTECTION, EFFICIENCY, AND COMFORT.
- 11.2.0 CLOTHING ENSEMBLES.
 - 11.2.1 Thermal Protection - includes electrically heated suits, arctic ensembles, coldbar suits, etc.
 - 11.2.2 Pressure Suits - includes high altitude, anti-"g," divers' suits, etc.
 - 11.2.3 Other Types of Protective Clothing - includes anti-radiation, decontamination, chemical protection, etc.
 - 11.2.4 Fabrics for Clothing - includes data on "clo" value, etc.
- 11.3.0 CLOTHING COMPONENTS.
 - 11.3.1 Belting - includes safety belts and harnesses, etc. (10.9.1).
 - 11.3.2 Body Gear - includes ballistic vests, flak suits, underclothing, etc.
 - 11.3.3 Headgear - includes helmets, oxygen masks, etc.
 - 11.3.4 Handgear.
 - 11.3.5 Footgear.
- 11.4.0 CLOTHING SIZE - includes anthropometric measures and systems of size specifications (7.2.1, 7.2.2).

11.5.0 PERSONAL EQUIPMENT.

11.5.1 Ear Defenders - includes plugs, pads, cushions, etc.

For Protective Devices - see 3.13.2.

11.5.2 Sleeping Bags.

11.5.3 Packs and Carriers - includes knapsacks, tumplines, "A" frames, packboards (7.3.3, 10.8.0).

11.5.4 Parachutes, Life Jackets, and Survival Equipment - see also 7.3.3, 10.8.0, 10.10.1.

11.5.5 Prosthetics - artificial limbs and other body parts.

11.6.0 EFFECTS OF COMBINATIONS OF CLOTHING AND PERSONAL EQUIPMENT - includes data on compatibility and interdependence of items (11.2.0) and effect on work space design (10.3.0, 10.3.1, 11.5.0).

11.7.0 SHELTERS - includes housing, tents, etc., for the comfort and protection of occupant personnel.

11.8.0 EQUIPMENT AND APPARATUS USED PRIMARILY FOR HUMAN ENGINEERING RESEARCH ON CLOTHING AND PERSONAL EQUIPMENT - e.g., clothing restriction tests.

12.0.0 SPECIAL ENVIRONMENTAL FACTORS AFFECTING PERFORMANCE

References on optimum and extreme ambient conditions as they influence human performance, health, or survival are found in this section.

12.1.0 BIBLIOGRAPHIES AND GENERAL REFERENCES PERTINENT TO SPECIAL ENVIRONMENTAL FACTORS AFFECTING PERFORMANCE.

12.2.0 THERMAL ENVIRONMENT - includes heating, air-conditioning, weather, and climate; excludes basic data on temperature sensitivity of the skin (5.2.0).

12.2.1 Temperature, Humidity and Air Velocity - includes heat tolerance, evaporative cooling, ventilation, windchill, air- and windblast (12.5.1).

12.2.2 Thermal Radiation - e.g., from sun, fires, and thermonuclear explosion.

12.3.0 TOXIC ENVIRONMENTS - includes atmospheric gases, airborne particles and microorganisms, and liquids that come into contact with the body surface or lungs (12.5.1, 12.5.2).

12.4.0 MOTION - includes forces of unusual amplitude, frequency or wave-form that act on the whole body (13.4.4).

12.4.1 Speed and Acceleration - includes "g" forces (positive and negative), blackout, redout, and impact injury (10.9.1, 10.9.2).

12.4.2 Vibration - includes data on vibration of the whole body at all frequencies including sonic and ultrasonic.

12.4.3 Motion Sickness - nausea and other symptoms following persistent whole-body oscillation of low frequency and large amplitude (13.5.3).

12.5.0 ALTITUDE AND DEPTH - (7.5.0, 13.4.4).

- 12.5.1 Atmospheric Pressure - includes information on decompression sickness, aero otitis media, etc., at high altitude and under water (12.3.C, 12.5.2).
 - 12.5.2 Oxygen Requirements - includes situations of high altitude and under water, studies of effects of hypoxia, oxygen toxicity (12.3.0).
 - 12.6.0 NUCLEAR AND COSMIC RADIATION - includes information on ionizing rays and particles from space, X-ray machines, radio-active materials, and nuclear reactors and explosions (7.5.0).
 - 12.7.0 SPACE TRAVEL - includes problems peculiar to life outside of the earth's atmosphere, e.g., weightlessness (7.5.0, 12.2.0, 12.4.0, 12.4.1, 12.5.0, 12.6.0).
 - 12.8.0 SENSORY DEPRIVATION - effects of isolation, lack of sensory stimulation, and monotonous environments upon behavior and performance.
 - For FACTORS DETERMINING ORIENTATION IN SPACE - see 6.3.2.
 - For UNUSUAL CHARACTERISTICS OF ARTIFICIAL AMBIENT LIGHTING AFFECTING VISUAL PERFORMANCE - see 3.3.4.
 - For EFFECTS OF AMBIENT NOISE AND BLAST ON PERFORMANCE - see 4.2.6.
 - 12.9.0 SPECIAL EQUIPMENT AND METHODS UTILIZED IN THE STUDY OF THE EFFECTS OF SPECIAL ENVIRONMENTS ON PERFORMANCE - e.g., climatic chamber, human centrifuge, techniques of thermal assessment.
 - 13.0.0 INDIVIDUAL FACTORS, WORK CONDITIONS, AND TASK CHARACTERISTICS THAT AFFECT BEHAVIORAL EFFICIENCY.
- References pertinent to a variety of psychological and physiological factors that are internal to the operator or dependent upon the task are included here, along with considerations of behavior decrement, the aging process, and effects of nutrition and drugs (for equipment and research methods see 1.2.5).
- 13.1.0 BIBLIOGRAPHIES AND GENERAL REFERENCES PERTINENT TO INDIVIDUAL FACTORS, WORK CONDITIONS, AND TASK CHARACTERISTICS THAT AFFECT BEHAVIORAL EFFICIENCY.
 - 13.2.0 FACTORS PERTAINING TO THE INDIVIDUAL - variables that are for the most part internal or intrinsic to the operator and independent of the task; excludes learning, 14.0.0.
 - 13.2.1 Motivation and Emotion - data on such factors as morale, incentives, level of aspiration, perception of self, anxiety, fear, and other emotional variables.
 - 13.2.2 Intelligence and Aptitudes - data on the relationship between the intelligence and/or aptitudes of the operator and his performance.
 - 13.2.3 Thought Processes - includes data on the cognitive processes of man as an independent unit, e.g., imagery, judgments, integration of concepts, and problem-solving; excludes Decision Theory (2.2.2) and man as a decision maker in a system (2.3.1).
 - 13.2.4 Attention, Alertness, Vigilance - includes studies referring to the central process determining performance on certain kinds of tasks, e.g., monitoring, watchkeeping, see 7.7.1 or, when related to systems studies in particular, 2.3.1.

13.3.0 INTERACTIONS BETWEEN INDIVIDUAL FACTORS AND WORK FACTORS - conditions arising within the individual as a result of interaction between individual factors and work factors.

13.3.1 Effects of Individual Understanding of Task or Set Toward Task - partial or selective perception and response, report (instructions), and perceptual anticipation.

13.3.2 Acceptability of Equipment and/or Task - includes consumer acceptance, attitude surveys pertinent to the design of equipment, preference studies.

13.3.3 Fatigue and Behavior Decrement - for visual fatigue see 3.14.0, for auditory fatigue see 4.2.6, for vigilance decrements see 14.1.0, for muscular strength and endurance see 7.3.3.

13.3.4 Stress - excludes monotony and sensory deprivation 12.8.0.

13.4.0 WORK, REST, AND EFFICIENCY - variables that are intrinsic to the task and relatively independent of the particular operator.

13.4.1 Conditions of Work - accuracy and speed requirements, length of work periods, distribution of rest periods; excludes effects of environmental conditions, 12.0.0.

13.4.2 Methods of Work - time and motion studies, self-pacing and forced-pacing.

13.4.3 Levels of Complexity - includes data on the number and degree of difficulty of discriminations required; excludes basic data on motor performance (7.6.0, 7.7.0).

13.4.4 Unusual Characteristics of the Work - includes potential injury, e.g., combat; physical punishment, e.g., rifle recoil; secondary tasks; excludes environmental conditions (12.0.0), as well as visual (4.2.6), and auditory (3.3.4), distractions. For sensory deprivation and monotony see 12.8.0.

13.5.0 EFFECTS OF PHYSIOLOGICAL FACTORS ON PERFORMANCE.

13.5.1 Sleep - data on the role of sleep and insomnia in the performance of a task.

13.5.2 Diet, Food, and Nutrition - includes studies on the effect of vitamin and nutritional deficiencies upon performance, studies on food preferences, feeding problems, food allowances, etc.

13.5.3 Effects of Drugs - includes studies on the effects of the administration and consumption of such substances as alcohol, tobacco, psychopharmaceutical agents, etc.

13.5.4 Effects of Aging - includes the effects of aging on psychological and physiological functions, e.g., thought processes, motor ability.

14.0.0 TRAINING AIDS AND DEVICES AND THEIR USE

This section deals with principles of design and application of training aids and devices in training programs, as well as references dealing with the outcomes of incorporation of aids in training programs. Also included are data on the phenomena of learning relevant to the design of aids and devices, and the development and institution of training programs.

14.1.0 BIBLIOGRAPHIES, GENERAL REFERENCES, AND COMPREHENSIVE REPORTS DEALING WITH SEVERAL ASPECTS OF TRAINING AIDS AND DEVICES - includes symposia, all-inclusive articles, handbooks, source lists, literature surveys, etc.

15.0.0 OTHER AREAS OF PSYCHOLOGICAL RESEARCH PERTINENT TO HUMAN ENGINEERING

A selected group of heterogeneous materials from the areas of social and personnel psychology of relevance to human engineering practice and research are included here.

15.1.0 PERSONNEL PSYCHOLOGY RELEVANT TO HUMAN ENGINEERING.

15.2.0 SOCIAL PSYCHOLOGY RELEVANT TO HUMAN ENGINEERING.

PART II

FACSIMILE OF SUBJECT MATTER FILES

The Facsimile of the Subject Matter Files which appears on the immediately succeeding pages is an integrated symbolic representation of the Code Categories of the preceding Topical Outline of the Literature in Human Engineering (Part I) and the succeeding listing of Citations and Abstracts (Part IV). In essence, it is a listing of the Accession Numbers (found in Part IV) which have been coded to each of the Code Categories (found in Part I). Inclusion of the Facsimile as part of the present bibliographic system permits maximal spatial condensation of the Topical Outline and also eliminates the need for printing a given citation and abstract more than once.

FACSIMILE OF SUBJECT MATTER FILES

Code Category Numbers

Accession Numbers

1.1.0	43	225	590	1,467	2,039	3,151	3,154
	3,820	4,232	4,817	5,662	11,383	13,355	14,029
	14,137	14,154	14,236	14,240	14,246	14,271	14,279
	14,301	14,341	14,342	14,349	14,355	14,366	14,389
	14,399	14,422	14,423	14,430	14,448	14,450	14,462
	14,505	14,521	14,587	14,604	14,605	14,621	14,637
	14,643	14,674	14,738	14,746	14,779	14,803	14,866
	14,875	14,929	14,963	14,999	15,000	15,001	15,014
	15,183	15,188	15,228	15,304	15,310		
1.2.0	13,028	13,029	13,089	14,392	14,497	14,541	14,739
	15,005	15,009	15,053	15,223			
1.2.1	289	3,674	4,817	13,009	13,047	13,050	13,077
	13,086	13,090	13,091	13,172	13,237	13,287	13,288
	13,291	13,295	13,314	13,339	13,340	13,341	13,342
	13,344	13,345	13,356	13,358	13,388	13,425	13,427
	14,161	14,212	14,306	14,382	14,390	14,391	14,426
	14,438	14,468	14,541	14,612	14,615	14,641	14,666
	14,688	14,696	14,731	14,768	14,792	14,795	14,799
	14,811	14,820	14,834	14,873	14,908	14,969	14,985
	15,012	15,013	15,056	15,085	15,099	15,124	15,150
	15,171	15,189	15,190	15,198	15,203	15,212	15,245
	15,270	15,276	15,281	15,283	15,286	15,296	15,305
1.2.2	1,855	4,564	4,607	4,755	4,837	5,227	5,506
	5,524	12,226	13,292	13,420	13,424	14,031	14,515
	14,516	14,517	14,519	14,520	14,638	14,780	14,807
	15,013	15,135	15,273				
1.2.3	1,231	5,401	13,014	13,018	13,019	13,036	13,048
	13,088	13,103	13,104	13,128	13,249	13,359	13,360
	13,388	13,419	13,431	14,160	14,538	14,673	14,675
	14,688	14,710	14,711	14,857	14,879	14,881	14,949
	14,978	15,012	15,085	15,230	15,233	15,283	
1.2.4	4,817	5,395	13,214	13,429	13,437	14,237	14,241
	14,287	14,556	14,647	14,708	15,272	15,282	15,291
1.2.5	3,204	3,595	3,625	5,639	11,045	13,179	13,346
	13,347	13,360	13,371	14,280	14,432	14,518	14,638
	15,225	15,283					
1.3.0	1,872	3,238	5,629	14,234	14,367	14,689	14,766
	15,065	15,223					
1.4.0	12,234	13,182	14,179	14,496	14,751	14,776	14,931
2.1.0	3,153	3,820	4,556	13,122	13,135	13,136	13,141
	13,178	13,191	13,192	14,088	14,137	14,214	14,462
	14,498	14,587	14,598	14,604	14,621	14,866	15,029
	15,301	15,303	15,304				
2.2.0	837	14,031	14,149	14,234	14,369	14,390	14,434
	14,598	14,638	14,653	14,707	14,766	14,780	14,781
	14,791	14,806	14,808	14,955	15,003	15,004	15,008
	15,013	15,165	15,166	15,217	15,275	15,285	15,316
	15,319						
2.2.1	3,606	4,286	4,511	5,724	13,134	13,264	13,287
	13,291	13,293	14,134	14,299	14,313	14,314	14,315
	14,495	14,582	14,587	14,589	14,641	14,657	14,668
	14,781	14,847	14,851	14,852	14,880	14,935	14,981

Code Category
Numbers

Accession Numbers

2.2.1 (cont'd.)	14,987 15,278	15,017	15,093	15,124	15,190	15,198	15,223
2.2.2	3,158 13,237 14,508 14,813 15,099	4,556 13,292 14,592 14,833 15,137	5,345 13,293 14,653 14,873 15,189	5,653 14,134 14,722 14,908 15,195	5,724 14,283 14,728 14,958 15,203	13,091 14,324 14,771 15,016 15,226	13,229 14,334 14,781 15,032 15,279
2.2.3	3,105 14,303 14,338 14,522 14,742	3,132 14,008 14,365 14,554 14,985	3,159 14,130 14,396 14,580 15,004	5,653 14,234 14,425 14,653 15,316	11,309 14,293 14,495 14,898	13,092 14,300 14,498 14,912	13,137 14,323 14,508 14,913
2.2.4	13,269	14,653	14,788	14,989			
2.3.0	11,309	15,087	15,129	15,131	15,151	15,220	15,301
2.3.1	3,105 14,275 14,522 14,650 14,894 15,029	3,640 14,323 14,523 14,723 14,899 15,037	13,292 14,324 14,553 14,725 14,953 15,078	14,134 14,334 14,559 14,795 14,967 15,220	14,176 14,408 14,564 14,802 14,980 15,297	14,195 14,425 14,582 14,852 15,008 15,301	14,242 14,503 14,586 14,880 15,013 15,308
2.3.2	287 3,205 4,745 5,523 13,290 14,239 15,054	428 3,595 4,754 5,524 13,291 14,282 15,253	1,203 4,206 4,772 5,528 13,340 14,283 15,303	1,401 4,481 4,992 5,589 13,370 14,592 15,304	1,425 4,555 5,377 5,621 14,025 14,998 15,312	2,011 4,556 5,480 5,639 14,161 15,004	3,204 4,557 5,510 5,724 14,172 15,015
2.3.3	13,134 14,211 14,616	13,183 14,308 14,775	13,264 14,324 14,899	13,287 14,334 15,119	13,293 14,523 15,226	13,294 14,580	13,340 14,583
2.3.4	590 14,707 15,131	13,183 14,744 15,220	13,215 14,901 15,303	14,150 15,080 15,304	14,219 15,087 15,312	14,432 15,118	14,498 15,129
2.3.5	1,344 13,286 14,284 14,965 15,131 15,191	1,808 13,289 14,498 14,988 15,133 15,208	1,841 14,023 14,508 14,989 15,135 15,216	3,050 14,031 14,517 15,080 15,151 15,287	3,153 14,073 14,932 15,088 15,165 15,288	4,124 14,074 14,939 15,126 15,166	13,137 14,169 14,942 15,129 15,175
2.3.6	1,958 13,272 14,338 14,554 14,838 15,129	3,132 13,336 14,351 14,581 14,839 15,131	3,505 14,151 14,369 14,679 15,003 15,199	5,647 14,242 14,398 14,758 15,016 15,252	11,281 14,282 14,434 14,781 15,033 15,253	13,199 14,317 14,473 14,817 15,084	13,270 14,328 14,544 14,818 15,128
3.1.0	796 14,541	14,216 14,776	14,217 14,803	14,221 14,963	14,274 14,972	14,329 15,126	14,505

Code Category
Numbers

Accession Numbers

3.2.0	3,157 14,658	14,249 14,954	14,274 14,972	14,373	14,410	14,528	14,624
3.2.1	13,169 14,890	13,199 15,322	13,312	14,410	14,459	14,528	14,595
3.2.2	13,169 14,890	14,296	14,318	14,376	14,421	14,459	14,565
3.2.3	14,410	14,686	14,730	14,734	14,946	14,957	
3.2.4	14,730	14,994					
3.3.0	14,447						
3.3.1	13,253 14,902	13,285 14,924	13,302 14,977	14,278 15,041	14,447 15,224	14,454 15,236	14,853 15,261
3.3.2	3,103 14,757 15,024	4,769 14,773 15,156	11,279 14,777 15,323	13,140 14,809	13,270 14,853	13,271 14,890	14,446 14,945
3.3.3	3,505	14,902					
3.3.4	14,160	14,278	14,902	15,059	15,173	15,174	
3.4.0	14,745						
3.4.1							
3.4.2	14,934						
3.4.3	5,398	14,841					
3.4.4	14,529	14,934					
3.5.0	4,739 14,467 15,126	4,765 14,469 15,196	14,151 14,554 15,215	14,219 14,630 15,226	14,281 14,631 15,233	14,322 14,657	14,427 14,775
3.5.1	2,906 14,550 14,829 15,200 15,268	13,164 14,630 14,830 15,206	13,248 14,662 14,838 15,211	14,259 14,679 14,839 15,230	14,281 14,694 15,048 15,231	14,321 14,700 15,196 15,240	14,427 14,783 15,197 15,261
3.5.2	4,292	13,164	13,368	14,321	15,033	15,200	
3.5.3	13,164 15,268	14,259	14,281	14,321	14,662	15,200	15,261
3.6.0	2,499 14,736	4,503 15,126	13,003 15,127	14,249	14,551	14,575	14,596
3.7.0	14,297	14,469	15,007	15,126	15,127		
3.7.1	3,485	11,281	13,184	14,922	14,923		
3.7.2	1,958	3,163	11,397	13,184	14,762		
3.7.3	11,283	13,129	13,184	14,379	14,597	14,964	15,267
3.8.0	1,376	1,932	2,506	3,173	5,329	11,279	14,263

Code Category
Numbers

Accession Numbers

3.8.0 (cont'd.)	14,297 14,824	14,340 14,898	14,649 14,964	14,691 15,007	14,697	14,723	14,745
3.8.1	14,350	14,540					
3.8.2							
3.8.3	3,651	14,540	14,720				
3.8.4	1,376	3,651	13,004	13,351	14,540		
3.8.5							
3.8.6	2,523	13,119	14,218	14,340	14,540	14,681	
3.9.0	4,286 14,227 14,595 14,783 15,206	4,969 14,255 14,607 14,825	6,626 14,273 14,610 14,826	13,098 14,294 14,654 14,828	13,389 14,386 14,694 14,835	13,391 14,446 14,695 14,836	14,212 14,461 14,767 14,972
3.9.1	11,397 14,835	13,390 15,048	14,350 15,322	14,610	14,783	14,825	14,830
3.9.2	13,360 15,048	14,607	14,610	14,767	14,783	14,836	14,905
3.9.3	6,626 14,273 14,835	13,003 14,350 14,868	13,004 14,446 14,974	13,026 14,504 15,322	13,392 14,729	13,395 14,734	13,410 14,770
3.10.0	3,104	4,232	14,211	14,227	15,022		
3.10.1	14,484						
3.10.2	3,915	15,209					
3.10.3	2,728	14,312	14,350	14,668	14,986		
3.10.4	15,029						
3.10.5	13,139 14,686 15,209	14,280 14,701	14,322 14,703	14,331 14,734	14,363 15,041	14,518 15,146	14,593 15,163
3.11.0	1,049	13,331	14,332	14,555	15,127		
3.12.0	14,255 14,573	14,264 14,595	14,294 14,954	14,358 14,957	14,386 14,976	14,461	14,559
3.12.1	3,173 14,371 15,058	13,270 14,676 15,214	13,271 14,940	13,328 14,954	13,332 14,976	14,222 15,033	14,331 15,037
3.12.2	3,103 14,470 15,033	3,155 14,677 15,139	4,132 14,809	13,270 14,853	13,271 14,946	14,286 14,954	14,359 15,024
3.13.0	14,837						
3.13.1	1,655 13,285	2,547 14,318	3,157 14,358	3,479 14,410	4,860 14,454	13,169 14,491	13,187 14,536

Code Category
Numbers

Accession Numbers

3.13.1 (cont'd.)	14,977	15,041	15,266				
3.13.2	13,392 14,730	14,224 15,167	14,363	14,376	14,387	14,410	14,686
3.14.0	5,421 13,395 14,537 15,206	13,003 13,396 14,676 15,209	13,148 13,408 14,694	13,187 13,413 14,868	13,205 14,252 15,010	13,250 14,478 15,041	13,392 14,530 15,205
3.15.0	3,150 14,561 14,868	4,946 14,586 14,954	13,297 14,600 15,041	14,410 14,614 15,044	14,496 14,634	14,502 14,732	14,542 14,861
3.15.1	3,218 14,930	13,408 15,224	13,436	14,614	14,634	14,714	14,861
3.15.2	4,640 13,321 13,428 14,600 14,861	13,146 13,326 13,436 14,608 15,177	13,164 13,329 14,252 14,658 15,202	13,166 13,384 14,333 14,732 15,212	13,187 13,391 14,407 14,821 15,214	13,308 13,408 14,435 14,832 15,230	13,312 13,417 14,597 14,855
3.15.3	5,398 14,380 14,884	13,307 14,421 14,924	13,322 14,459 15,073	13,325 14,597 15,177	13,392 14,687 15,202	13,395 14,732 15,236	14,296 14,855
3.15.4	2,134 13,329 13,410 14,614 15,177	13,118 13,330 14,296 14,634 15,214	13,298 13,331 14,345 14,635	13,303 13,332 14,371 14,651	13,307 13,360 14,502 14,686	13,325 13,363 14,525 15,058	13,328 13,378 14,571 15,139
3.15.5	4,647 13,331 14,950	5,687 13,416 15,186	13,020 14,294 15,202	13,239 14,446 15,212	13,312 14,677 15,214	13,321 14,700	13,324 14,734
3.15.6	2,951 13,386 14,574	4,957 13,389 14,620	13,161 14,229 14,651	13,210 14,278 14,770	13,310 14,411 14,979	13,326 14,504 15,073	13,369 14,565 15,172
3.15.7	13,035 13,282 13,378 14,273 14,729	13,039 13,315 13,384 14,395 14,754	13,146 13,320 13,392 14,453 15,059	13,149 13,322 13,408 14,455 15,085	13,161 13,330 13,415 14,525 15,186	13,166 13,337 13,417 14,548 15,317	13,241 13,366 13,435 14,706
3.15.8	13,042 14,734	13,321 14,754	13,327 14,883	14,403 15,274	14,570	14,701	14,729
3.15.9	3,157 13,034 13,187 13,413 14,469 15,224	3,186 13,038 13,204 13,415 14,478	4,957 13,040 13,253 13,438 14,494	6,626 13,118 13,305 14,294 14,572	13,026 13,123 13,369 14,337 14,573	13,027 13,152 13,386 14,455 14,633	13,033 13,159 13,394 14,467 14,837
3.15.10	13,007 13,250 14,252 14,478 14,825	13,015 13,389 14,273 14,607 14,829	13,016 13,391 14,294 14,610 14,830	13,079 13,396 14,386 14,654 14,836	13,155 13,404 14,445 14,658 14,905	13,167 13,408 14,446 14,694 14,956	13,241 14,112 14,461 14,695 14,976

Code Category
Numbers

Accession Numbers

3.15.10 (cont'd.)	14,979	14,990	15,163	15,214	15,236	15,240	
3.15.11	13,032	13,034	13,079	13,151	13,204	13,251	13,252
	13,326	13,353	13,395	13,409	13,431	14,229	14,255
	14,273	14,848	14,923	15,163	15,184	15,209	15,235
	15,236						
3.15.12	5,108	5,696	13,012	13,013	13,025	13,282	13,353
	13,360	14,180	14,439	14,440	14,441	14,443	14,573
	14,620	14,633	14,660	14,755	14,886	15,249	
3.16.0	13,042	14,134	14,322				
3.16.1	2,134	13,363	13,378	14,303	14,371	15,058	
3.16.2	2,951	13,305	13,394	14,337	14,410	14,451	14,724
	14,848	15,023	15,159	15,168	15,169	15,269	
3.16.3	2,956	4,969	5,629	13,036	13,043	13,106	13,107
	13,311	13,312	13,323	13,327	13,363	13,392	13,405
	13,428	14,212	14,403	14,410	14,445	14,570	14,593
	14,608	14,629	14,694	14,732	14,735	14,821	14,828
	14,829	14,831	15,212	15,233			
3.16.4	13,324	14,270	14,379	14,588	14,823	15,127	
4.1.0	3,263	3,820	4,023	13,049	13,127	14,531	14,577
	14,667	14,674					
4.2.0	3,092	13,049	13,225				
4.2.1	3,107	13,227	14,414	14,467	14,469		
4.2.2	3,505	11,033	14,362	14,428	14,646	14,995	
4.2.3	14,474						
4.2.4	3,107	13,074	13,260	13,262	14,307	14,661	
4.2.5							
4.2.6	13,001	13,081	13,211	13,260	13,361	14,352	14,442
	14,452	14,889	15,021	15,026	15,192		
4.2.7	11,033	13,101	13,105	13,211	14,208	14,209	14,401
	14,474	14,625	14,678	14,871	14,995	15,141	
4.3.0	2,293						
4.3.1	13,176	14,644					
4.3.2							
4.3.3	13,225						
4.4.0	3,263	14,709					
4.4.1	14,308						
4.4.2	435	14,616					
4.5.0	14,709						

Code Category
Numbers

Accession Numbers

4.5.1	14,286	14,709					
4.5.2							
4.5.3	13,268	15,195					
4.5.4	14,824						
4.6.0	13,263	14,507	14,709				
4.7.0	3,021	13,115	13,268	14,071	14,661	14,975	
4.8.0	3,109	3,263	13,127	14,394	15,074	15,075	
4.8.1	4,090 13,254	13,094 14,394	13,111 14,705	13,112 14,973	13,114 15,074	13,131 15,075	13,132 15,090
4.8.2	728 13,174 14,405	3,979 13,254 14,753	13,115 13,259 15,090	13,126 14,254	13,133 14,277	13,171 14,336	13,173 14,346
4.8.3	13,084 14,346	13,097 14,452	13,103	13,104	13,153	13,259	13,264
4.8.4	13,084 14,388	13,093 14,531	13,112 14,532	13,171 14,533	13,174 14,644	13,177 14,733	14,346
4.8.5	13,133	14,336	14,405	14,532	15,074	15,075	
4.8.6	3,979	5,725	13,254	14,254	14,346	14,405	14,619
4.8.7	2,066	13,112	13,132	14,491	14,705	14,973	
4.9.0	13,225	13,260					
4.9.1	530 14,543	3,092	3,131	13,072	13,267	13,403	13,414
4.9.2	3,092 13,256 14,926	3,131 13,262	3,930 14,381	13,045 14,585	13,046 14,622	13,073 14,671	13,076 14,798
4.9.3	13,082	13,227	13,256	13,266	13,414	15,047	
4.9.4	13,045 13,170 13,256 13,414 15,026	13,073 13,206 13,257 14,208 15,047	13,085 13,224 13,258 14,277 15,132	13,101 13,226 13,263 14,354	13,102 13,228 13,266 14,507	13,115 13,235 13,267 14,627	13,133 13,255 13,409 14,926
4.9.5	4,090 13,226 14,759	13,045 13,255 14,798	13,046 13,262 15,138	13,075 13,266 15,265	13,083 14,360	13,105 14,361	13,170 14,622
4.9.6	13,037	13,158	14,347				
4.9.7	2,473 13,257	2,502 13,403	3,131 14,225	5,108 14,491	13,095	13,224	13,227
4.9.8	13,148	13,155	13,251	14,543			
4.9.9	13,018 14,711	13,046 14,978	13,096	14,135	14,507	14,673	14,710

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4.9.10	530 14,678	3,930 14,710	13,211 14,978	13,439 14,995	14,277 15,047	14,466	14,543
4.9.11	13,049 14,680	13,110 14,759	13,258 14,798	13,267 14,849	14,480	14,481	14,622
4.9.12	3,930 14,208 14,644 15,047	13,036 14,277 14,646 15,065	13,110 14,354 14,678 15,141	13,172 14,381 14,689 15,195	13,225 14,394 14,693	13,414 14,466 14,849	14,135 14,543 14,973
5.1.0	14,640						
5.1.1	3,180 14,207 15,006	4,912 14,557 15,241	13,014 14,632	13,018 14,670	13,019 14,680	13,072 14,793	13,130 14,878
5.1.2	13,251	13,252	13,351	14,491	15,070	15,296	
5.1.3	6,882	14,632	14,793	14,878	15,006	15,241	
5.1.4	13,014	13,019	14,260				
5.2.0							
5.2.1	5,096	14,207	14,568	15,153			
5.2.2	14,877						
5.3.0							
5.3.1	13,018	13,206	14,327	14,557	14,642	14,763	
5.3.2	13,206						
5.4.0	5,234						
5.4.1	4,573 14,493	13,231 14,546	13,240 14,623	13,335 14,765	14,196 14,876	14,397	14,487
5.4.2							
5.4.3	4,573	13,335	14,196	14,397	14,534		
5.5.0	5,696						
5.5.1	5,642	13,017	13,039				
5.5.2	15,023	15,296					
5.5.3	5,063	13,036					
5.6.0							
5.6.1	2,004 14,741	3,650 15,019	5,045 15,274	5,316	13,031	14,256	14,443
5.6.2							
5.7.0	5,514	13,142	13,204	13,251	13,252	13,409	14,629
6.1.0	14,211	14,801	15,301				

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6.2.0	13,252	14,801						
6.2.1	13,148 15,018	13,232	13,409	14,094	14,953	14,980	15,005	
6.2.2	13,017	13,018	13,087	13,351				
6.3.0	5,696	13,232	13,409	13,413	14,553	14,801		
6.3.1	5,108	13,023	13,024	13,238	13,264	14,511	14,553	
6.3.2	3,168 13,234 14,663	3,169 13,413 14,685	5,696 14,439 14,741	13,024 14,440 14,748	13,054 14,441 14,921	13,160 14,443 14,996	13,205 14,626	
7.1.0	13,385	14,094	15,149	15,299				
7.2.0	14,460							
7.2.1	5,262 14,159 14,690	11,040 14,232 14,800	13,180 14,233 15,106	13,185 14,243 15,263	13,219 14,285	13,220 14,460	13,296 14,464	
7.2.2	215	13,121	14,243	14,800	15,208			
7.3.0								
7.3.1	14,243	14,261	15,300					
7.3.2	14,719	15,106						
7.3.3	3,162 14,261 15,208	11,856 14,298 15,300	13,180 14,413	13,185 15,025	13,190 15,100	13,220 15,110	13,281 15,117	
7.4.0	13,296 15,291	14,243	14,558	14,719	14,919	14,920	15,289	
7.5.0	2,003 13,058 14,357 14,888 15,114	3,137 13,200 14,372 14,966 15,293	3,162 13,217 14,458 14,974	4,213 13,316 14,476 15,031	4,755 13,377 14,659 15,034	11,856 14,115 14,726 15,061	13,057 14,267 14,786 15,111	
7.5.1	913 14,258 15,100	2,003 14,267 15,110	4,213 14,272 15,114	5,110 14,287	13,044 14,326	13,406 14,556	14,241 14,708	
7.6.0	4,946 15,299	5,395 15,300	13,385	14,016	14,515	14,685	15,103	
7.6.1	391 14,436	3,619	5,642	5,669	13,008	13,317	14,413	
7.6.2	11,856	13,124	13,181	13,317	14,261	14,393	14,533	
7.6.3	13,118	13,369	14,261	15,106				
7.6.4	3,155 13,418 15,072	13,023 14,299 15,136	13,041 14,393 15,241	13,107 14,809 15,250	13,113 15,018 15,295	13,317 15,024 15,298	13,350 15,044 15,303	
7.6.5	391	2,582	13,116	13,364	14,562			

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7.6.6	3,100	14,237	14,352	14,785	15,238		
7.6.7	2,013	13,181	14,925	15,103	15,144	15,296	
7.7.0	621	2,582	4,947	13,011	13,022	13,023	13,080
	13,116	13,117	13,160	13,280	13,413	13,432	13,433
	14,016	14,210	14,404	14,485	14,649	14,685	14,755
	15,018	15,037	15,313				
7.7.1	5,008	13,006	13,099	13,100	13,179	13,272	14,122
	14,264	14,352	14,470	14,473	14,559	14,563	14,564
	14,611	14,938	14,967	15,005	15,010	15,235	15,247
7.7.2	391	1,211	1,235	1,539	1,610	1,655	1,764
	3,481	3,483	3,640	4,187	4,280	5,716	13,092
	13,107	13,118	13,125	13,157	13,168	13,186	13,196
	13,248	13,319	13,352	13,411	13,433	13,434	14,176
	14,177	14,190	14,193	14,195	14,275	14,291	14,522
	14,601	14,617	14,790	14,795	14,802	14,843	14,846
	14,874	14,899	15,014	15,078	15,093	15,112	15,124
	15,125	15,162	15,204	15,217	15,223	15,247	15,267
	15,292	15,297	15,302	15,303	15,305	15,308	15,313
7.7.3	3,159	3,656	4,702	13,144	13,165	13,169	13,280
	13,334	13,364	14,072	14,073	14,074	14,740	14,890
	15,028	15,039	15,072	15,078	15,277	15,296	15,298
7.7.4	1,235	3,105	3,481	3,674	4,178	13,000	13,022
	13,092	13,108	13,116	13,352	14,177	14,485	14,503
	14,522	14,666	14,740	14,898	15,081	15,223	15,299
8.1.0	✓ 5,452	11,856	14,220	14,329	14,505	14,960	14,963
	15,301						
8.2.0	3,651	14,370	14,371	14,431	14,769	15,142	
8.3.0	12,594	15,039	15,129				
8.3.1	3,619	5,329	5,452	5,565	5,642	13,005	14,788
	15,014	15,070	15,155	15,262			
8.3.2	5,642	12,473	13,196	14,026	14,288	14,292	14,406
	14,915	15,042	15,107	15,125	15,250		
8.3.3	4,702	13,180	13,190	14,778	14,816		
8.3.4	15,242						
8.3.5	✓ 1,610	1,784	5,329	13,000	14,788	15,221	15,267
8.4.0	3,159	14,647	15,039				
8.4.1	5,452	13,188	15,262				
8.4.2							
8.5.0	✓ 1,211	1,784	3,661	5,227	5,565	5,669	11,259
	13,003	13,188	13,196	13,319	14,406	14,482	14,816
	14,891	14,915	15,025	15,039	15,042	15,107	15,155
	15,221	15,242	15,297				
8.6.0							

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8.7.0	3,880	14,193					
8.7.1	5,329 14,601	13,196 14,769	13,284 15,136	13,317 15,155	13,319	14,195	14,406
8.7.2	5,329 15,136	5,642	13,186	13,319	14,406	14,778	14,816
8.7.3	3,485 13,434 14,723	3,651 14,263 14,790	5,452 14,329 15,125	13,154 14,370 15,136	13,188 14,482 15,297	13,432 14,681 15,303	13,433 14,697 15,306
8.7.4	1,211 13,434 14,723 15,136	1,539 14,176 14,795 15,246	1,764 14,190 14,802	3,105 14,193 14,843	3,880 14,195 14,894	13,186 14,223 15,029	13,433 14,601 15,125
8.7.5	3,640	14,723	15,115	15,301	15,303	15,308	
9.1.0	✓ 13,109	14,420	15,129	15,301	15,303		
9.2.0	✓ 3,505	14,238	14,691	14,721			
9.3.0	✓ 14,420	14,433	15,142	15,221			
9.4.0	1,936 15,307	11,140 15,311	14,238	14,420	14,647	15,136	15,221
9.4.1	15,010	15,250					
9.4.2	✓ 1,936	5,227	13,188	14,292	14,647		
9.5.0							
10.1.0	✓ 3,820	14,094	14,702	14,742	14,943	14,961	15,057
10.2.0	✓ 13,070 15,107	14,239 15,108	14,351 15,131	14,387	14,431	14,581	14,800
10.2.1	11,140 14,510	13,121 14,537	13,271 14,676	13,272	13,279	14,239	14,328
10.2.2	✓ 13,121 15,142	14,239	14,328	14,436	14,510	14,891	15,109
10.2.3	14,239	14,328	14,510				
10.3.0	3,505	14,239	14,328	14,351			
10.3.1	3,108 14,330 14,984	11,140 14,356 15,042	11,259 14,413 15,107	11,401 14,486 15,108	13,212 14,652 15,109	14,239 14,778 15,160	14,262 14,816 15,218
10.3.2	14,239	14,262	14,477	14,704	15,108		
10.3.3	14,239	14,328	14,510				
10.4.0	2,353 14,652	13,190 14,840	14,239	14,328	14,351	14,477	14,581
10.5.0							
10.6.0	13,154	14,261	15,109				

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10.7.0	11,401 15,129	14,239 15,131	14,261 15,135	14,328 15,208	14,513	14,742	15,118
10.8.0	11,401	14,344	14,742				
10.9.0	590 14,387 14,498	678 14,433 14,911	3,150 14,456 15,046	13,030 14,457 15,309	13,199 14,471	13,373 14,483	14,348 14,484
10.9.1	3,150 14,800 15,044	14,387 14,803 15,045	14,549 14,804 15,120	14,676 14,805 15,255	14,713 14,901 15,256	14,794 14,944 15,258	14,797 15,024
10.9.2	413 13,199 13,272 14,477 14,658 15,057	633 13,205 13,279 14,562 14,903 15,063	678 13,207 14,179 14,590 14,959	2,353 13,209 14,236 14,626 14,962	4,098 13,213 14,262 14,750 14,983	13,055 13,270 14,356 14,758 15,028	13,063 13,271 14,433 14,840 15,046
10.10.0 ✓	4,503 14,638	4,905 14,960	11,401	13,056	13,067	13,068	14,305
10.10.1 ✓	13,271 14,251	13,273 14,475	13,274 14,806	13,275 15,096	13,276 15,097	13,279 15,142	14,230 15,306
10.10.2	426 3,915 14,351 14,809	1,667 11,283 14,362 14,824	2,506 13,052 14,400 14,984	3,047 14,098 14,581 15,129	3,163 14,132 14,756	3,505 14,322 14,758	3,783 14,328 14,776
10.10.3	3,485	14,387	14,504	14,510	14,591	15,108	15,193
10.10.4	2,751	3,880	14,318				
10.10.5	11,259						
11.1.0	15,111						
11.2.0							
11.2.1	14,250 15,035	14,269 15,105	14,332	14,417	14,552	14,937	14,997
11.2.2	13,060 14,594	13,061 15,072	14,250	14,253	14,311	14,368	14,488
11.2.3	3,525	4,004	14,599	14,814			
11.2.4	14,268	14,327	15,149				
11.3.0							
11.3.1	740	3,149	14,262	14,704			
11.3.2	14,717						
11.3.3	2,293 14,900	3,161 14,997	14,233 15,123	14,265	14,285	14,725	14,871
11.3.4	13,364	14,155	14,547	14,567	14,997	15,105	
11.3.5	4,217	14,377	14,472	14,566	14,594	14,997	15,104

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11.4.0	4,217	14,232	14,233	14,566	14,594		
11.5.0	13,065						
11.5.1	13,105	14,361	14,577	14,871	15,077		
11.5.2							
11.5.3	13,196	15,102	15,110	15,113	15,115	15,164	
11.5.4	13,064	13,273	14,251	14,475	14,490		
11.5.5	5,562 15,154	11,139	14,194	14,289	14,412	14,786	14,917
11.6.0	14,265	14,285	14,312	14,613	14,730		
11.7.0	3,179						
11.8.0	4,576 15,144	13,065	14,232	14,268	14,527	14,566	15,104
12.1.0	13,052 14,702 14,943	13,198 14,803 15,011	13,212 14,844 15,161	14,228 14,806	14,236 14,906	14,535 14,914	14,640 14,929
12.2.0	13,068	14,245	14,303	14,304	14,332	14,659	15,021
12.2.1	3,100 13,278 14,509 14,822 14,974	3,137 13,372 14,567 14,832 14,997	4,187 13,381 14,652 14,846 15,035	4,203 14,302 14,669 14,865 15,091	4,213 14,357 14,672 14,937 15,144	13,208 14,417 14,684 14,966 15,247	13,221 14,458 14,772 14,968
12.2.2	3,525	4,004	11,140	14,302	15,091		
12.3.0	3,179	13,068	14,599	14,872	14,991	15,031	
12.4.0	13,213	14,180	14,301	14,888	15,019	15,021	
12.4.1	5,045 13,152 13,278 14,373 14,652 14,941	12,967 13,196 14,115 14,375 14,684 14,943	13,051 13,213 14,251 14,387 14,704 14,966	13,069 13,216 14,266 14,424 14,713 14,970	13,078 13,217 14,311 14,489 14,749 15,019	13,138 13,219 14,316 14,535 14,782 15,036	13,143 13,273 14,372 14,545 14,916
12.4.2	3,180 14,320 14,982	5,092 14,578 14,992	13,216 14,640	13,278 14,670	14,251 14,718	14,316 14,819	14,319 14,827
12.4.3	13,138	13,214	14,796	14,864	14,872	15,019	
12.5.0	13,059	13,066	13,067	13,068	14,192	14,295	14,888
12.5.1	13,061 14,476	13,201 14,477	13,208 14,584	13,222 14,721	13,273 15,071	14,253 15,170	14,384 15,248
12.5.2	413 14,276 14,968	4,178 14,492 15,034	5,082 14,627 15,096	13,064 14,726	13,147 14,772	13,273 14,822	14,189 14,870
12.6.0	3,505	13,030	13,147	13,189	13,194	13,197	13,203

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12.6.0 (cont'd.)	14,198	14,305	14,353	14,411	14,418	14,512	14,524
	14,576	14,591	14,712	14,715	14,745	14,774	14,815
	14,888	14,906	14,910	15,021	15,060	15,079	15,122
12.7.0	13,056	13,138	13,193	13,197	13,200	13,203	13,216
	13,278	13,357	14,174	14,189	14,261	14,353	14,375
	14,465	14,501	14,650	14,652	14,685	14,702	14,704
	14,727	14,748	14,749	14,810	14,842	14,862	14,863
	14,921	14,941	14,943	14,961	14,993	14,996	15,019
	15,021	15,055	15,071	15,097	15,157	15,176	15,187
	15,219	15,248	15,254	15,314			
12.8.0	3,110	13,118	13,147	13,299	13,300	13,372	13,381
	13,400	14,189	14,606	14,660	14,886	14,887	14,897
	14,933	15,134	15,176				
12.9.0	4,178	12,967	13,059	13,062	13,108	13,120	13,193
	13,195	13,201	13,208	13,213	13,217	14,215	14,231
	14,261	14,326	14,492	14,527	14,535	14,584	14,683
	14,692	14,810	14,906	14,961	15,158	15,219	15,244
13.1.0	13,212	14,108	14,137	14,803	14,869	14,914	15,215
13.2.0	1,425	2,011	2,661	2,730	4,164	4,553	4,557
	4,563	4,810	5,012	5,340	5,377	5,660	11,379
	13,428	13,430	13,432	13,435	14,093	14,099	14,105
	14,107	14,169	14,301	14,549	14,618	14,727	14,810
	14,835	14,881	15,015	15,121	15,192	15,313	
13.2.1	287	428	2,157	2,590	2,754	3,204	3,210
	3,483	4,187	4,203	4,556	4,817	4,992	5,024
	5,026	5,098	5,110	5,146	5,215	5,280	5,281
	5,346	5,347	5,466	5,468	5,528	5,686	5,687
	13,030	13,125	13,208	13,318	13,343	13,377	13,387
	13,390	14,007	14,126	14,161	14,357	14,364	14,449
	14,450	14,639	14,905	15,204	15,259	15,293	
13.2.2	932	5,708	13,010	13,361	13,379	14,041	14,042
	14,144	14,258	14,416	15,095	15,135	15,192	15,313
13.2.3	4,123	4,556	4,563	4,658	4,659	4,817	4,946
	4,987	4,995	5,006	5,339	5,340	5,345	5,346
	5,433	5,480	5,528	5,592	5,708	11,379	13,037
	13,142	13,163	13,338	13,361	13,367	13,370	13,374
	13,376	13,387	14,280	14,416	14,569	14,639	14,668
	14,685	14,771	14,933	14,947	14,949	15,024	15,067
	15,068	15,086	15,201	15,204	15,247		
13.2.4	3,421	5,008	5,421	5,708	13,006	13,099	13,100
	13,179	13,244	13,245	13,272	13,279	13,208	13,402
	13,430	14,122	14,264	14,286	14,352	14,470	14,473
	14,559	14,563	14,564	14,611	14,938	14,947	14,967
	15,005	15,010	15,204	15,235	15,247		
13.3.0							
13.3.1	621	728	1,539	2,002	2,913	3,155	4,481
	4,987	5,339	5,340	5,347	5,466	5,468	5,646
	13,000	13,005	13,015	13,023	13,039	13,097	13,280
	13,313	13,362	13,389	13,401	14,564	14,606	14,695
	14,703	14,729	14,897	15,235			

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13.3.2	5,024 14,730	13,002 14,769	13,159 14,984	13,362	13,365	14,330	14,497
13.3.3	1,453 13,283 14,966 15,204	5,215 14,007 15,044 15,210	5,421 14,311 15,095 15,237	5,471 14,320 15,112 15,239	5,527 14,463 15,176 15,303	13,195 14,740 15,185	13,208 14,911 15,197
13.3.4	3,210 13,001 15,259	3,483 13,008	5,110 13,030	5,346 13,245	5,347 13,432	5,660 14,007	13,000 15,185
13.4.0	13,242 15,294	13,244 15,302	13,247	13,349	13,430	14,515	14,659
13.4.1	1,453 13,165 14,560 15,204	4,481 13,208 14,659 15,235	5,026 13,584 14,810 15,238	5,527 13,589 15,112 15,239	13,000 14,210 15,144	13,010 14,334 15,185	13,163 14,364 15,197
13.4.2	14,515	14,659	14,810				
13.4.3	15,302						
13.4.4	3,656 5,660 13,361 14,578 15,059 15,253	4,178 13,030 13,376 14,618 15,162 15,259	4,187 13,125 13,402 14,683 15,185	4,203 13,163 13,432 14,843 15,204	4,213 13,195 14,193 14,911 15,210	5,026 13,208 14,210 14,966 15,217	5,110 13,245 14,352 14,991 15,219
13.5.0	4,213	11,856	13,053	13,145	13,155	13,201	13,357
13.5.1	4,213 15,204	5,470 15,237	5,617	14,947	14,974	15,130	15,185
13.5.2	4,213 14,509 15,060	5,146 14,572 15,117	5,262 14,690 15,162	13,162 14,810 15,187	13,362 14,872	14,421 14,896	14,501 14,994
13.5.3	5,082 5,615 13,437 14,737 15,205	5,098 5,617 14,192 14,763 15,237	5,215 13,144 14,244 14,864 15,256	5,444 13,217 14,421 14,688 15,259	5,526 13,277 14,437 14,910	5,592 13,377 14,444 15,061	5,614 13,429 14,603 15,148
13.5.4	5,262 13,379 14,690	5,281 13,419 14,931	13,032 13,428	13,041 14,257	13,111 14,380	13,113 14,560	13,209 14,597
14.1.0	215 1,445 3,479 4,564 5,480 13,022 13,150 13,242 13,333 13,389 14,008 14,025 14,044	1,400 1,655 3,483 4,607 5,685 13,028 13,157 13,243 13,349 13,390 14,009 14,027 14,047	1,417 2,157 3,619 4,739 5,716 13,037 13,160 13,246 13,354 13,418 14,010 14,029 14,048	1,418 2,590 3,880 4,745 6,882 13,082 13,167 13,264 13,366 13,421 14,016 14,030 14,049	1,440 3,050 3,985 4,762 13,003 13,108 13,229 13,313 13,367 14,000 14,020 14,031 14,063	1,443 3,169 4,206 4,765 13,011 13,124 13,230 13,319 13,376 14,003 14,023 14,041 14,071	1,444 3,219 4,553 4,820 13,016 13,145 13,234 13,332 13,387 14,007 14,024 14,042 14,072

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Numbers

Accession Numbers

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14,073	14,074	14,082	14,088	14,093	14,095	14,096
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14,119	14,121	14,122	14,124	14,125	14,126	14,130
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14,163	14,167	14,172	14,178	14,180	14,181	14,182
14,183	14,187	14,190	14,191	14,201	14,202	14,203
14,204	14,226	14,291	14,300	14,339	14,365	14,418
14,425	14,429	14,431	14,490	14,506	14,512	14,519
14,556	14,588	14,596	14,611	14,617	14,649	14,725
14,736	14,747	14,755	14,758	14,784	14,803	14,823
14,866	14,867	14,895	14,898	14,899	14,907	14,912
14,913	14,932	14,935	14,940	14,948	14,971	14,975
14,978	14,985	14,986	15,010	15,016	15,022	15,037
15,038	15,066	15,067	15,068	15,069	15,076	15,082
15,087	15,088	15,089	15,094	15,116	15,125	15,126
15,127	15,143	15,152	15,165	15,166	15,178	15,179
15,180	15,181	15,182	15,234	15,251	15,252	15,253
15,294	15,302	15,313				

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1,119	1,231	1,400	1,417	1,418	1,440	1,443
1,445	2,345	2,661	2,728	2,729	2,730	3,021
3,158	3,210	3,219	3,625	4,123	4,164	4,543
4,553	4,559	4,563	4,658	4,659	4,755	4,810
4,813	4,817	4,946	4,947	4,992	5,466	5,468
11,378	13,345	13,355	13,369	13,371	14,047	14,063
14,073	14,074	14,082	14,088	14,093	14,095	14,096
14,097	14,105	14,107	14,116	14,119	14,121	14,124
14,125	14,126	14,149	14,154	14,159	14,163	14,181
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14,290	14,293	14,306	14,355	14,402	14,426	14,449
14,506	14,609	14,618	14,747	14,779	14,780	14,914
14,928	14,942	15,015	15,120	15,137	15,273	15,276

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287	428	1,203	1,401	1,425	3,205	3,595
4,556	4,557	4,754	4,772	4,810	5,377	5,510
5,523	5,621	5,639	5,686	13,079	13,290	13,314
13,355	13,357	13,370	14,161	14,604	14,803	14,914
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PART III

ALPHABETICAL INDEX TO THE HUMAN ENGINEERING LITERATURE

The Alphabetical Index to the Human Engineering Literature (A.I.) that follows on the immediately succeeding pages is a device intended to facilitate the user's search for materials in the present bibliography. In essence, it is a list of approximately 2820 terms and phrases, synonymous with the categories in the preceding Topical Outline. Use of the A.I. should compensate for variation in the user's vocabulary and/or the project staff's possible capriciousness in establishing the titles of the subject matter categories in the Topical Outline. It is recognized that user reaction and additional staff experience should lead to expansion and revision of the A.I. in subsequent editions.

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PART IV

CITATIONS AND ABSTRACTS

The format of citations on the immediately succeeding pages is generally in keeping with the recommendations of the Publication Manual of the American Psychological Association (Psychol. Bull., 1952, 49, 389-445). In some instances, however, variation in the amount and type of information in the original document has introduced some variation in the final citation. It should be noted that the content of the citation tries to maximize such information (e.g., author's name, contract number, contracting agency, and in some cases the author's institutional or geographical location) as is needed to permit the user to acquire a copy of the document.

The "descriptive" abstracts on the following pages have been prepared with the intent of answering only two questions for the user: "Does information exist on my problem?" and "What would I have to read to obtain such information?" It was the intention of the project staff not to provide any summary of findings or conclusions in the abstracts in order that the user might not be tempted to use such findings without the context of qualification which the original and complete document provides. Another distinctive feature of the abstract is the descriptive code of letters and numbers found at the end of the abstract. The T, I, G, and R designations indicate that the document contains: T-tables, I-illustrations, G-graphs, and R-references cited in the article or document (e.g., R 17 means that 17 references were cited by the author). The availability of such code information should facilitate the user's decision to examine specific documents in particular detail.

Documents cited are not available from the Office of Naval Research, the U.S. Air Force Office of Scientific Research, the U.S. Army Office of Research and Development, or from Tufts University.

Key to Abbreviations
found in Abstracts

C	Centigrade	kg	kilogram
CAA	Civil Aeronautics Administration	L	Lambert
cc	cubic centimeter	lb.	pound
CIE	Council of the Illuminating Engineering Society	ml	millilambert
cm	centimeter	mph	miles per hour
cps	cycles per second	msec	millisecond
db	decibel	mu	millimicron
EEG	Electroencephalogram	OTAT	Objective-Analytic Personality Test
EMG	Electromyogram	PGR	Psychogalvanic Skin Response
ERG	Electroretinogram	ROTC	Reserve Officers Training Corps
F	Fahrenheit	rpm	revolutions per minute
ft.	foot	SAGE	Semi Automatic Ground Environment
ft.-L	foot-Lambert	USA	United States Army
g	gravity	USAF	United States Air Force
GCA	Ground Control Approach	USMC	United States Marine Corps
ISR	Galvanic Skin Response	USN	United States Navy
ICI	International Commission on Illumination	VFR	Visual Flight Rules
IFR	Instrumental Flight Rules		

Key to Abbreviations of
Military and Government Organizations

AFCRC	Air Force Cambridge Research Center, Cambridge, Mass.
CAA	Civil Aeronautics Administration, Washington, D. C.
CEPE	Central Experimental and Proving Establishment, Royal Canadian Air Force, Cold Lake, Alberta, Canada
CONARC	Continental Army Command, Fort Monroe, Va.
MRC	Medical Research Council, London, England
NACA	National Advisory Committee for Aeronautics, Washington, D. C.
NADC	Naval Air Development Center, Johnsville, Penna.
NAMC	Naval Air Material Center, Philadelphia, Penna.
NATO	North Atlantic Treaty Organization, Paris, France
NDRC	National Defense Research Council, Washington, D. C.
ONR	Office of Naval Research, Washington, D. C.
OSU	Ohio State University Research Foundation, Columbus, Ohio
RNPRC	Royal Naval Personnel Research Committee, London, England

CITATIONS AND ABSTRACTS

43

Duffy, Elizabeth. THE CONCEPT OF ENERGY MOBILIZATION. Psychol. Rev., Jan. 1951, 58(1), 30-40. (University of North Carolina, Durham, N. C.).

The thesis of this paper is that there is a basic aspect of behavior which may be referred to as energy mobilization or energy level. It is suggested that certain descriptive categories of psychology can be replaced by two basic concepts, energy mobilization and direction. An attempt is made to clarify further the meaning of the concept mobilization and present data are offered in support of the basic nature of the concept. R 37

96

Chapanis, A. VISION. Annu. Rev. Psychol., 1951, 11, 45-64. (Johns Hopkins University, Baltimore, Md.).

This report is an annual review of publications in the field of vision. The period covered is primarily 1949-1950. The review is divided into the following areas: 1) basic visual functions--dark adaptation, visual acuity, color adaptation, color-vision defects; 2) visual perception--figural after-effects, perception of vertical and horizontal; 3) physiological bases of the visual process--electrical studies, single fiber studies, photochemistry of the retina; and 4) applied visual research--dials, radar scopes, reviews of human engineering data, visual requirements in industry, and visual fatigue. R 96

215

Johns Hopkins University. PRESENTED AREAS OF AN AVERAGE PRONE CHINESE INFANTRYMAN. Contract DA 36 034 ORD 375RD, Proj. TB 3 0238A, Proj. THOR TR 6, March 1952, 50pp. Institute for Cooperative Research, Johns Hopkins University, Baltimore, Md.

Studies of the effectiveness of weapons for attack of ground troops require knowledge of the target presented area. The average presented area of a typical Chinese infantryman prone on the ground is given as a function of the angle of arrival of fragment or bullet. World War I dimensions of the average United States infantryman were scaled by a relative stature factor to represent those of the average Chinese infantryman. Some applications of the results are suggested. T. G. I. R 3

225

USN Special Devices Center. BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS REVISED 1 JANUARY 1953. 1953, 23pp. USN Special Devices Center, Port Washington, N. Y.

This bibliography lists the human engineering reports issued by the Special Devices Center. The period covered is from 1946 through 1952. For each report the following information is given: author, title, rate of issue, classification, and report number. Titles are organized under broad subject matter titles: learning, motor skills, perception, voice communications, extreme environmental factors, systems analysis, controls and displays, training devices, and general. R 362

287

Gibbons, C. C. EMPLOYEE ATTITUDES AND PRODUCTIVITY. Mich. Bus. Rev., Nov. 1953, 5(6), 4pp. (W. E. Upjohn Institute for Community Research, Kalamazoo, Mich.).

This article discusses the relationship between productivity and employee attitudes. Suggestions are offered through which management should be able to improve relationships with employees, such as keeping the worker informed about the goals of the organization, encouraging wider participation by giving the workers opportunity to express their ideas about operations, and providing the right kind of leadership.

289

Chapanis, A. NOTES ON AN APPROXIMATION METHOD FOR FITTING PARABOLIC EQUATIONS TO EXPERIMENTAL DATA. Psychometrika, Dec. 1953, 18(4), 327-336. (Johns Hopkins University, Baltimore, Md.).

When a numerical transformation of raw data is used only to simplify the arithmetic of curve fitting, the transformation may lead to undesirable and even highly distorted results. This principle is illustrated with an approximation method of fitting parabolic equations to experimental data. The usefulness of this method is discussed and its limitations pointed out. T. G. R 4

391

Simon, J. R., De Crow, T. W., Lincoln, R. S. & Smith, K. U. EFFECTS OF HANDEDNESS ON TRACKING ACCURACY. Percept. Mot. Skills Res. Exch., 1952, 4, 53-57. (University of Wisconsin, Madison, Wisc.).

This paper deals with two aspects of motion--hand usage and handedness--in relation to tracking accuracy. Forty subjects, half of whom performed a direct tracking task and half an aided tracking task, were used. Of each group of 20 subjects, ten were right-handed and ten were left-handed. Five of each of the groups were assigned at random to track with the right hand, while the other five used the left hand. The

results were summarized in terms of the relative tracking accuracy obtained with preferred and non-preferred hands and of right- and left-handed individuals on both types of tracking tasks. T. I. R 4

USAF Directorate Flight Safety Research. OXYGEN EQUIPMENT PROBLEMS. PERIOD: 1 JULY 1953 THROUGH 30 JUNE 1954. Publ. 2 55, Feb. 1955, 52pp. USAF Directorate Flight Safety Research, Norton AFB, Calif.

The data relative to oxygen equipment problems that occurred during the period July, 1953 through June, 1954 were analyzed in an effort to determine the extent of the problem and to recommend remedial steps. The analysis was made relative to 1) oxygen regulators and 2) oxygen equipment other than regulators. Major causes of in-flight hypoxia were determined. Recommendations for corrective action are included. T. I.

Simanonok, J. E. & Harris, I. D. PHASE V (ADVERSE WEATHER) FLIGHT TEST OF THE F-84F-15 AIRCRAFT. S 430 296, Tech. Note WCT 54 52, July 1954, 57pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.

Flight tests were conducted to evaluate the suitability of the F-84F type aircraft for night and all-weather operation. Data obtained during the evaluation have been used to prepare recommended flight techniques and procedures. The F-84F is a single-place, swept-wing, high-altitude fighter aircraft. T. G. I.

Robson, R. A. H. & Chapin, F. S. RESEARCH ON THE RELATION OF COMMUNICATION AND MORALE TERMINAL REPORT ON PROJECT D. Contract N8ONR 66216, April 1953, 12pp. University of Minnesota, Minneapolis, Minn.

To ascertain the effects of various types of progress reports on the "morale" of a group, 240 subjects were assigned to nine different groups on the basis of high or low valence values held by the individual subject. The degree of valence was ascertained by observations made before the experimental session began. Six high valent and three low valent groups performed coding operations in a simulated Civil Defense Headquarters Communications Center. Six types of progress reports (continued failure or success, success followed by failure or the reverse, fluctuating success followed by failure, and success followed by no information) were given for 35 minutes, following which they could keep on working or could stop. Group performance and cohesiveness

were then compared for the various valence groups. T. I

Pride, A. M. INVESTIGATION OF RADIO RECEIVER OUTPUT POWER REQUIREMENTS IN AIRCRAFT RADIO SYSTEMS. Proj. TED PTR EL 41005, ET314 7, Feb. 1953, 47pp. USN Air Test Center, Naval Air Station, Md.

Investigations of radio receiver audio output power requirements in various aircraft radio systems were carried out. Correlation among the several factors affecting the usable audio power levels is masked by the marked variations in the required levels among several individuals, as well as for a single subject at different times and under differing conditions. However, the average values of audio output power contained in this report are considered the minimum satisfactory values for the various aircraft in which the tests were conducted. T. G.

Petran, L. A. AN EXPERIMENTAL STUDY OF PITCH RECOGNITION. Psychol. Monogr., 1932, 42(6 - Whole 193), 1-124. (Johns Hopkins University, Baltimore, Md.).

This study of "absolute pitch" is concerned primarily with the accuracy with which absolute pitch discriminations can be made. Nine subjects with absolute pitch, four with relative pitch, and four control subjects tuned a Stern tone variator to violin "a" purely from memory ten times a day for ten days. In all cases the subjects had heard no music or tones for half an hour before tuning the variator. In a second test, sixteen subjects were required to identify a note (struck on a piano) by the pitch name of the tone; 50 notes were identified, one each day. The results of the two tests were compared. T. G. R 118

Graham, C. H. RECENT MEETINGS OF THE ERGONOMICS RESEARCH SOCIETY. Tech. Rep. ONRL 52 53, April 1953, 14pp. USN Office of Naval Research, London, England.

Three meetings of the Ergonomics Research Society during 1953 are reported. The topics considered were 1) ergonomic considerations in railway jobs, 2) men and machines in transport systems, and 3) ergonomics and accidents, and ergonomics and industry.

Hagin, W. V. THE INFLUENCE OF TYPE OF INSTRUCTIONS ON THE PERFORMANCE OF A PERCEPTUAL-MOTOR TASK. Proj. 21 09 004, Res. Bull. 51 7, May

1951, 29pp. USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Tex.

To investigate the influence of the media through which set is established by instructions upon a complex motor task, the SAM Complex Coordination Test was administered with standard time limits, under three different conditions of instruction to three groups of basic airmen. Group I (236 subjects) read the instructions from a typed card and were shown a demonstration with no oral explanation. Group II (194 subjects) were given oral instructions accompanied by demonstration. Group III (261 subjects) were given the standard instructions. Additional tests were given: 13 paper-and-pencil tests and five psychomotor tests. Inter-correlations were obtained between scores on these measures and scores on the coordination test. The data were analyzed for differences that could be attributed to instructions. T. R 4

633

Hovgard, P. E. BIOMECHANICS - A NEW APPROACH TO AIRPLANE SAFETY. Mech. Engng., Sept. 1944, 613-614. (Curtis Wright Corporation, Buffalo, N. Y.).

This note presents a brief summary of a paper concerned with the approach to aircraft safety that is concerned with the human factors and their limitations in relation to the design and construction of the airplane. Features that will compensate for the conditions rather than attempting to avoid them are recommended. Specific examples from crash injury research are cited. R 1

678

Gratz, C. M. BIOMECHANICS A NEW APPROACH TO AIRPLANE SAFETY. Mech. Engng., May 1944, 313-314.

Successful cooperation between surgeons and engineers leads to an exchange of techniques known as biomechanics, a division of the larger sphere of biological engineering. The application of these techniques to airplane safety is discussed. Many examples are given. R 2

728

Moser, H. M., Dreher, J. J., O'Neill, J. J. & Oyer, H. J. LISTENER RESPONSE SET TO VARIOUS TEST FORMS. Contract AF 19(604) 1577, Proj. 7681 & RF Proj. 664, Tech. Rep. 38, AFCRC TN 56 59, Oct. 1956, 39pp. Ohio State University Research Foundation, Columbus, Ohio.

To see what pattern, if any, emerged from a series of random guesses or answer selections on several different kinds of blank test forms (two-alternative, seven-place multiple-choice, multiple-choice cross-outs, both vertical and horizontal arrays of two to fourteen items, rating scale requiring a choice of a number between two and fourteen, and rating scale of cross-out type) a group

of approximately 60 subjects were tested on each of the forms. The task was to check the appropriate item on the test blank as though actual test questions (or stimuli) were present. Response distributions for each type of test were analyzed in terms of reactions to the physical setup of the answer sheets. T. G. R 15

740

USA Board Number 3. SERVICE TEST OF EXPERIMENTAL INDIVIDUAL LOAD CARRYING EQUIPMENT, PARTIAL REPORT OF PROJECT 2646. Proj. DA 7 82 05 005, Jan. 1955, 3pp. USA Board Number 3, Fort Benning, Ga.

A belt with web equipment and a new quick-release type buckle was given a service test. Twenty experimental belts and 20 standard belts were worn with the Experimental Load Carrying Equipment, T-54-10, by an infantry rifle platoon over a 30-day test period. Five test subjects were timed as the belt was donned and removed five times. The findings were reviewed and recommendations concerning the suitability of the belt were made. 1.

837

Korn, K. T. WHAT IS MANAGEMENT RESEARCH? Ergonomics, March 1953, 11(3), 9-12.

In this note, management research is explained by discussing what it does. The development and the philosophy which underlie the activity are discussed.

913

Fishman, S. DEVELOPMENT OF A SHORT BATTERY OF TESTS TO PREDICT PHYSICAL EFFICIENCY GRADES OF WEST POINT CADETS. PJ 4086 03, R and A RCS, PRS Rep. 735, Feb. 1947, 12pp. USA Personnel Research Section, Adjutant General's Office, Washington, D. C.

To develop a short battery of physical proficiency tests from a preliminary battery of 19 tests which could be used to predict several criteria of cadet performance at West Point during the first year, data were gathered on cadets in the graduating class of 1949. At time of entrance (1945) 598 cadets had been given ten tests and 110 had been given nine additional tests. Scores on the tests were analyzed for their relationship to 1) total physical education grade at end of first year, 2) WPP-1 IV/IV, a "buddy rating" on physical competence, and 3) discharges and resignations during the first year. T. G.

932

Keats, J. A. FORMAL AND CONCRETE THOUGHT PROCESSES. Contract N60NR 270 20, Proj. NR 150 088, Aug. 1955, 93pp. Princeton University & Educational Testing Service, Princeton, N. J.

This project was an empirical investigation of predictions derived from a theory by Piaget concerning the development of intelligence. In particular, three content areas were studied (arithmetic, probability, and inequalities) making use of group testing procedures and special statistical techniques for analysis. A test, consisting of 74 specially prepared items dealing with the three areas, was administered to children from grades four through ten (approximately 200 in the first two grades and 300 in the others). The results were compared with predictions derived from theory. T. G. I. R 24

1049

Walsh, R.K. CAMOUFLAGE SCHEMES FOR HELICOPTERS FOR CONCEALMENT AGAINST TERRAIN BACK-GROUNDS FINAL REPORT. Proj. T 973, March 1956, 32pp. USMC Development Center, Quantico, Va.

To develop suitable camouflage for Marine Corps helicopters operating in combat areas, tests were conducted in three phases: 1) laboratory investigations were initiated to formulate paints; 2) panel tests were made to ascertain, on a small scale, the adequacy of the paints; and 3) a full scale field test was carried out utilizing these paints applied to a helicopter. Various seasonal schemes were tested by visual inspection including color photographic coverage for recording purposes and visual inspection with infrared viewing devices including infrared coverage. I. R 5

1119

Bair, J. T. & Ambler, Rosalie K. A COMPARISON OF ATTRITION RATES AMONG AVIATION OFFICER CANDIDATES, OTHER OFFICER STUDENTS, AND NAV-CADS. Spec. Rep. 56 19, Attrition Rep. 20, June 1956, 4pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To compare current attrition rates for three different types of flight trainees, a study was made of 327 aviation officer candidates, 749 naval aviation cadets, and 459 officers under instruction. These three groups parallel each other in terms of entry and progress through the program with pre-flight school training complete. Attrition rates by type (flight failure, voluntary withdrawal, ground school failure, not physically qualified, not officer material, and other) were calculated and compared. The findings are discussed in relation to recruitment policies. T.

1203

Hollander, E. P. VARIABLES UNDERLYING SOCIOMETRIC STATUS. I. A THEORETICAL MODEL OF IDIOSYNCRATIC BEHAVIOR AND STATUS. Contract NONR 1849(00), Tech. Rep. 4 56, July 1956, 19pp.

Psychological Labs., Carnegie Institute of Technology, Pittsburgh, Penn.

This paper presents a theory of behavior which centers about idiosyncratic behavior (non-conformity) and yields a status variable in the form of group-awarded "idiosyncrasy credits". Background considerations, determinants of idiosyncratic behavior, idiosyncrasy credits and their determinants, and group variables are discussed along with a symbolic representation of the mechanisms of the model. The implications of the model for the study of status, or leadership, are discussed. I. R 27

1211

Norris, Eugenia B. & Spragg, S. D. S. STUDIES IN COMPLEX COORDINATION. 1. PERFORMANCE ON THE TWO-HAND COORDINATOR AS A FUNCTION OF THE PLANES OF OPERATION OF THE CONTROLS. Contract N60NR 241, Proj. NR 783 006, & SDC Human Engng. Proj. 20 M 1D, SDC TR 241 6 3, Aug. 1950, 16pp. USN Special Devices Center, Port Washington, N. Y. (Dept. of Psychology, University of Rochester, Rochester, N. Y.).

To investigate performance of a two-hand coordination task as a function of the planes of rotation of the controls, the SAM Two-Hand Coordinator was modified so that each crank control could be placed in any one of a variety of planes. Three planes were investigated: horizontal, vertical and parallel to the frontal body plane, and vertical and perpendicular to the frontal body plane. Each of ten groups of subjects was given preliminary trials on one plane of rotation; each of nine groups was then assigned to one of a combination of planes; the tenth group continued practice on the preliminary combination. The results were analyzed in terms of mean time on target and for differences between groups which could be attributed to plane of rotation. T. G. I. R 12

1231

Mackie, R. R. SEVERAL TREATMENTS OF INTER-GROUP DIFFERENCES AND THEIR EFFECT ON THE RELIABILITY AND PREDICTABILITY OF PERFORMANCE RATINGS. Contract NONR 1113(00), Proj. NR 151-141, BuMedSurg. Proj. 002-013, Tech. Rep. 3, ca. 1954, 17pp. Management and Marketing Research Corporation, Los Angeles, Calif.

The question of how rating scores obtained from different small subgroups of personnel can be combined to obtain the most reliable and predictable criterion was investigated. The men comprising the sample were scattered in small groups among 16 submarines in the Pacific Fleet and represented a wide variety of rates and pay grades. Each were rated by three

different raters on a rating scale of 20 traits using a man-to-man format. Several treatments of the scores were investigated from the standpoint of their effect on 1) inter-rater agreement and 2) predictability of the ratings by several logically related variables. T. R 7

1235

Stevens Institute of Technology, Hoboken, N.J. PHOTOGRAPHIC TRIANGULATION FOR ASSESSING ANTI-AIRCRAFT GUNNERY. Contract NSORI 54, July 1947, 6pp. USN Special Devices Center, Port Washington, N.Y.

A method for assessing anti-aircraft gunnery by means of photographic triangulation is described. The apparatus is also described and includes the various devices designed to eliminate tedious computations and measurements which enable one unskilled man to do the equivalent of three technicians in assessing anti-aircraft gunnery problems. R 2

1344

Melson, R.R., Clark, J.d'A. & Couch, R.deS. SUBSISTENCE PACKAGING AND PACKING. VOLUME V. Operation Studies I, Jan. 1947, 161pp. USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.

This study covers the operations of the Packaging and Packing Branch of the Subsistence Research and Development Laboratory (now designated The Quartermaster Food and Container Institute) during World War II. The purpose and organization of the Branch are discussed along with a general introduction to the work in the development of adequate food packaging materials and packing procedures during the war period. Following chapters deal with test methods, flexible packaging materials, glass and plastic containers, cans, wax dipped cartons, waterproof bag case liners, packing, flexible unit packages, and ration assembly. T. 1.

1376

Foley, P.J. A SUMMARY OF EXPERIMENTS TO DATE ON THE APPLICATION OF NON LINEAR SCALES OF THE LOGARITHMIC TYPE TO ALTIMETER DESIGN. DRML 160 1/0 164, PCC D77 94 20 27, March 1956, 14pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

As a result of experiments carried out on the interpretation of non-linear scales of the logarithmic type, a single pointer, single revolution altimeter display was designed. A range from ten feet to 60,000 feet was used. This display was evaluated in terms of interpretation error with controlled exposure time and with uncontrolled exposure time. T. G. 1. R 2

1400

USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE AIRCRAFT PROPELLER REPAIRMAN GRADUATES OF TTAFC COURSE NUMBER AB42131. FINAL REPORT. Proj. APG/CSC/1005/A, June 1956, 29pp. USAF Operational Test Center, Eglin AFB, Fla.

To determine the ability of the apprentice aircraft propeller repairman to perform the duties of his Air Force specialty, four apprentices, who represented a cross-section of a graduating class of the Aircraft Propeller Repairman Course, were tested in a 90-day on-the-job situation. The work performed each day was rated by the immediate supervisor. The nature and extent of any additional instruction needed to complete any job was recorded. These data were analyzed and recommendations for improvement of the training course were made. T.

1401

Katz, D., Kahn, R.L., Jacobson, E., Morse, Nancy E., et al. HUMAN RELATIONS PROGRAM OF THE SURVEY RESEARCH CENTER. FIRST THREE YEARS OF DEVELOPMENT. Contract N6 ONR 232, Task II, Sept. 1950, 30pp. Institute for Social Research, University of Michigan, Ann Arbor, Mich.

This report on the Human Relations Program summarizes the activities and findings of the program since its inception in 1947. The report is based on five papers given at a conference (September, 1950) as follows: 1) An overview of the human relations program, Daniel Katz; 2) An analysis of supervisory practices and components of morale, Robert L. Kahn; 3) Foreman and steward, representatives of management and the union, Eugene Jacobson; 4) An experimental study in an industrial organization, Nancy C. Morse; and 5) Development and future plans of the human relations program, Angus Campbell. R 18

1417

USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE AIRCRAFT CONTROL AND WARNING OPERATOR GRADUATES OF TTAFC COURSE NO. AB27330. FINAL REPORT. Proj. APG/ADC/976 A, July 1956, 27pp. USAF Operational Test Center, Eglin AFB, Fla.

This report is concerned with graduates of Technical Training Air Force Course Number AB27330, Aircraft Control and Warning Operator, who were tested in an on-the-job situation to determine their abilities to perform the duties of their specialty. Assignments in an aircraft warning and control

1418

situation and in an airborne early warning and control situation were followed. Recommendations are offered for improvement of the training. T.

1418

USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE AIRCRAFT MECHANIC (RECIPROCATING, OVER TWO ENGINES) GRADUATES OF TTAF COURSE NUMBER AB43131B-1. FINAL REPORT. Proj. APG/CSC/975 A, July 1956, 41pp. USAF Operational Test Center, Eglin AFB, Fla.

To determine the ability of the apprentice aircraft mechanic to perform the duties of his Air Force specialty, eight apprentices, representing a cross section of a graduating class of the course, were tested in a 90-day on-the-job situation. The work performed each day was rated by the immediate supervisor. The nature and extent of any additional instruction needed to complete a job was recorded. These data were studied and recommendations for improvement of the training course were made. T.

1425

Courtney, D., Greer, F.L., Masling, J.M. & Orlans, H. NAVAL, NEIGHBORHOOD, AND NATIONAL LEADERSHIP (THREE REPORTS) ANNUAL TECHNICAL REPORT. Contract N8ONR 69401, Series 1953 - Inst. Rep. 1, Feb. 1953, 108pp. Institute for Research in Human Relations, Philadelphia, Penn.

The work in the field of leadership that is being carried on by the Institute for Research in Human Relations emphasizes 1) real life situations, 2) the follower in the leader-follower relations, 3) relationships between personality syndromes in both leader and followers and their social behavior, and 4) group or social memberships of followers and social roles of leaders as they interact in social behavior. Three facets of this work are presented here: 1) a study of leadership in a real military situation at the U. S. Naval Training Center, Banbridge, Maryland, by Joseph Masling; 2) a study of neighborhood leaders in certain areas of Philadelphia, by F. Loyal Greer; and 3) leadership attitudes and ideology as reflected in national polls, by Harold Orlans.

40

USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE PERSONNEL SPECIALIST GRADUATES OF TTAF COURSE NUMBER AB73231. FINAL REPORT. Proj. APG/CSC/1006 A, June 1956, 12pp. USAF Operational Test Center, Eglin AFB, Fla.

To determine the ability of the apprentice personnel specialist to perform the duties of his specialty upon graduation

from the preparatory course, seven apprentices, representing a cross section of a graduating class, were tested in a 90-day on-the-job situation. The apprentices were assigned to the normal routine duties of personnel specialists and worked with or for other specialists who rated them daily on job performance. The ratings and observations were analyzed and recommendations made relating to training and reorganization of duties within the specialty. T.

1443

USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE RECIPROCATING ENGINE MECHANIC GRADUATES OF TTAF COURSE NUMBER AB43231. FINAL REPORT. Proj. APG/CSC/947 A, April 1956, 26pp. USAF Operational Test Center, Eglin AFB, Fla.

To determine the ability of apprentice aircraft reciprocating engine mechanics to perform the duties of their Air Force specialty upon graduation from the preparatory course, six apprentices, representing a cross section of their specialty, were tested in a 90-day on-the-job situation. The apprentices were utilized in the normal tasks of the specialty and were rated daily by supervisors who were responsible for the proper performance of the job. If assistance were required to complete a job, the nature and extent of such assistance was noted. These data were analyzed and recommendations made for the improvement of training. T.

1444

USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF THE B-52B FLIGHT SIMULATOR, TYPE S-9. FINAL REPORT. Proj. APG/SAS/165 A 2, June 1956, 35pp. USAF Operational Test Center, Eglin AFB, Fla.

An operational suitability test of the type S-9 B-52 B Flight Simulator (a device to provide realistic transition, instrument, and emergency training for B-52 pilots) was conducted. The following specific areas were investigated: 1) installation and initial checkout including configuration for problem-free installation, facility requirements, and man-hour requirements; 2) sustained daily operation including training requirements, man-hour requirements, logistics, and maintenance requirements; and 3) suitability as a training device, including physical and performance similarity and ability to produce an acceptable training environment. The evaluation was based on an eight-month use period.

1445

USAF Operational Test Center. EMPLOYMENT AND SUITABILITY TEST OF APPRENTICE AIRCRAFT MECHANIC

(JET, OVER TWO ENGINES) GRADUATES OF TFAF COURSE NUMBER AB43131E 1. FINAL REPORT. Proj. APG/CSC/1030-A, Aug. 1956, 25pp. USAF Operational Test Center, Eglin AFB, Fla.

To determine the ability of the apprentice aircraft mechanic to perform the duties of his Air Force specialty, eight apprentices, representing a cross section of a graduating class of the 14-week Mechanic Course were tested in a 90-day, on-the-job situation. They worked in the flight line organizational maintenance section and were rated each day by supervisory personnel. Additional instruction required to accomplish the work was recorded. Analysis of the data was made and recommendations offered for improvement of training. T.

1453

Hoffman, A.C. & Mead, L.C. THE PERFORMANCE OF TRAINED SUBJECTS ON A COMPLEX TASK OF FOUR HOURS DURATION. Contract OEMSR 581, Proj. Memo. 1, OSRD Rep. 1701, July 1943, 11pp. Tufts University, Medford, Mass.

To test the hypothesis that individuals would show signs of fatigue (decrement in efficiency of performance) when continuously engaged for relatively long periods of time in a task of psychological complexity, five subjects worked four hours at a complex task that required the continuous matching of dials as well as periodic adjustment of peripheral apparatus. Performance scores were analyzed as a function of time.

T. G. 1.

1467

Adams, Marjorie M., Wiley, L.N. & Arnoult, Billye K. INDEX TO HUMAN RESOURCES RESEARCH CENTER 1952 PUBLICATIONS. Res. Bull. 52 43, Dec. 1952, 37pp. USAF Human Resources Research Center, Lackland AFB, Tex.

This index provides a convenient means of reference to all Research Bulletins, Technical Reports, Conference Reports, and Research Notes which were published by the Human Resources Research Center during the calendar year 1952. Presented first is a complete list of all the publications. Abstracts of the unclassified Bulletins and Reports are followed by an author and subject matter index. R 163

1539

Poulton, E.C. PERCEPTUAL ANTICIPATION IN TRACKING. A.P.U. 118/50, Aug. 1950, 27pp. Psychological Lab., MRC, Cambridge, England.

To investigate the part played by perceptual anticipation in tracking under different conditions, two experimental arrangements were used. In one the subject had to trace regular or irregular courses under conditions of restricted vision, with or

without a preview. In the other, the subject either had to keep a pointer in line with a second pointer moving in a harmonic course by using a positional control (following or pursuit tracking) or had to keep a single pointer moving in this way, stationary on a fixed line (compensatory tracking). A detailed analysis of errors in performance under the various experimental conditions was made and related to the perceptual anticipation component. G. I. R 17

1604

Johnson, A.P. EXPERIMENTAL COMPARISON OF SIGHTING AND TRIGGERING PERFORMANCE WITH HAND GRIPS AS COMPARED TO HAND WHEEL CONTROLS ON THE B-29 PEDESTAL SIGHT. Memo. Rep. TSEAA 8 694 2, May 1946, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

To determine the principle of control action best adapted to the capacities of the user, a study was made of the accuracy of sighting and triggering when using a new type handgrip control as compared to a handwheel control on the B-29 Pedestal Sight. Each subject was required to operate both types of controls for similar time periods but on different days. For each series a time score was obtained for tracking and ranging correctly and for triggering while tracking and ranging correctly. Recommendations for design changes in controls are made on the basis of the results.

1610

Ellson, D.G. & Hill, H. ACTION POTENTIALS DURING TRACKING. Contract W33 038 AC 13968, TSEAA 694 21, Rep. 9, Dec. 1947, 18pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Psychology, Indiana University, Bloomington, Ind.).

To determine the relationship between type of tracking (position or rate) and the type of muscular movement involved, action potentials from the biceps and triceps muscles were recorded during performance of a tracking task that involved primarily the activity of these two muscles. Tracking error and the two sets of action potential figures were compared graphically and by correlational methods in an effort to identify the type of movement--ballistic or moving fixation. R 1

1655

Corso, J.F. & Harker, G.S. THE USE OF VARIABILITY SCORES FOR DETERMINING THE PROBABILITY OF FIRST-SHOT HITS OF STEREOSCOPIC RANGE FINDER OPERATORS. Proj. 6 64 11 05, Sub-Proj. 11 05 (1), MEDEA, Rep. 48, Sept. 1950, 7pp. USA Medical Research Lab., Fort Knox, Ky.

This study derives from Gaussian statistics a mathematical formula which can be used to calculate the probability of a first-shot hit for any given range finder operator variability score. The choice, from the tables given, of a particular variability score as a criterion in the selection of stereoscopic range finder operators needs to be validated by the study of a large number of operators over a reasonable period of time. T. G. R 4

1667

Yarbrough, J. R. PHASE VI TEST OF THE H-25A HELICOPTER. AF Tech. Rep. AFFTC 53 22, June 1953, 38pp. USAF Flight Test Center, Edwards AFB, Calif.

This report presents the results of a 150-hour functional development test on the production model H-25A helicopter, a search and rescue, utility-cargo type aircraft. Various types of test missions were flown and performance records made; problems of maintenance were analyzed; pilots' comments were obtained on general handling qualities, cockpit and cabin items, controls and flight characteristics, landing and ground operation, and hoist operation; and operational data as to availability and ability to perform missions were analyzed. Recommendations are included. T. G. I.

1764

Ellson, D. G. & Gray, Florence E. FREQUENCY RESPONSES OF HUMAN OPERATORS FOLLOWING A SINE WAVE INPUT. Contract W33 038 AC 13968, Memo. Rep. MCREXD 694 2N, Rep. 14, Sept. 1948, 41pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Psychology, Indiana University, Bloomington, Ind.).

To test the linearity of the human operator, four subjects were required to track a sine wave input by operating double handgrips which rotated on a vertical axis. An "input" pointer moved in a horizontal slot; a second pointer directly below the input pointer was controlled by the handgrips. Experimental variables were 1) input frequency (one-half to four cycles/second), 2) input amplitude, and 3) ratio between handgrip rotation and output pointer movement. The records were analyzed to determine 1) amplitude of movement of output pointer as a percentage of input pointer amplitude and 2) phase shift of the output in degrees (displacement in time of input-output waves). T. G. I. R 2

1784

Grether, W. F. A STUDY OF SEVERAL DESIGN FACTORS INFLUENCING PILOT EFFICIENCY IN THE OPERATION OF CONTROLS. Memo. Rep. TSEAA 694 9, Nov. 1946, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

To investigate the effect upon human efficiency in operating aircraft type controls of several variations in the type of control movement used, tests were carried out in a simplified cockpit mockup. The task was to keep an oscillating pointer centered on a reference mark by a control. Five possible control movements were available: rudder pedal, and two planes of movement (as for aileron and elevator control) of either stick or wheel. Several variations of leg and arm angle were investigated as well as type of control movement. Efficiency was measured by time-on-target and analyzed for differences due to type of control, direction of movement of hands and arms, leg angle and arm angle. T. I. R 7

1808

Greenspan, H., Burak, H. & Pretti, R. CASE STUDY DATA ON PRODUCTIVITY AND FACTORY PERFORMANCE. 5. HORSEPOWER, INDUCTION MOTORS. BLS Rep. 55, Feb. 1954, 142pp. US Bureau of Labor Statistics, Dept. of Labor, Washington, D. C.

This report is primarily for the use of European production managers, superintendents, and methods engineers who are concerned with productivity problems. One section is devoted to the highlights of the manufacturing operations and productivity of five selected plants producing five-horsepower induction motors. Detailed case studies of each plant are presented in a second section, and a third presents a brief discussion of workers' earnings and the benefits to the worker due to increased productivity and unionization, where applicable. T. G. I.

1841

Shields, D. & Gentel, T. G. COTTON TEXTILE DYEING AND FINISHING CASE STUDY DATA ON PRODUCTIVITY AND FACTORY PERFORMANCE. BLS Rep. 66, June 1954, 151pp. US Dept. of Labor, Washington, D. C.

This report is primarily for the use of European production managers, superintendents, and methods engineers who are concerned with productivity problems. Case study data on seven cotton textile dyeing and finishing plants are presented in three chapters. Chapter I is directed primarily to the reader who is interested in the general aspects of productivity of this industry. General information about the plants and a detailed discussion of the various processes used in dyeing and finishing are given. Chapter II contains the detailed case studies. Chapter III contains a brief discussion of workers' earnings and the benefits to the worker of increased productivity and unionization, where applicable. Appended are case studies of labor adjustment to technological change, industry background information, and glossary of terms. T. G. I

1855

Evans, R.N. A SUGGESTED USE OF SEQUENTIAL ANALYSIS IN PERFORMANCE ACCEPTANCE TESTING. Contract N6OR1 07142, Proj. NR153 124, ca. 1950, 31pp. University of Illinois, Urbana, Ill.

Procedures for performance acceptance testing are examined and sequential sampling procedures (widely used in industrial acceptance of supplies) are proposed as an economical and useful procedure. The major sections of the report are devoted to an examination of sampling in testing, choosing a sequential sampling plan, and tentative suggestions for putting a sequential sampling plan into operation. T. G. R 5

1872

Armington, J.C. AN ELECTRONIC PSYCHO GALVANOMETER FOR STUDENT USE. J. Psychol., Feb. 1949, 28, 3-7. (Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.).

The construction of a psychogalvanometer suitable for demonstration, lie detection, and student use is described. The meter proper may be used with an extension cord at a point remote from the chassis, making possible projection of the meter dial upon a screen. Because of its non-linear characteristics the instrument may be used from subject to subject without any balancing or adjustment of resistance networks; only the voltage of a single flashlight cell is applied to the subject. It is compact, portable and cannot be damaged by improper operation. I. R 4

1932

Correll, H.M. FLARE-OUT CONTROL FOR LANDING. GACA 54 4, March 1954, 31pp. USAF Institute of Technology, Wright-Patterson AFB, Ohio.

This report describes a flare-out system which was developed to provide a blind landing system. The flare-out computer was simulated with a C-54 type aircraft on a Reeves Analog Computer using a pilot as the error sensing element. The results of the study are discussed and suggestions made for investigating the applicability of the system under actual flight test conditions. I. R 4

1936

Dvorak, A. A ONE-HAND KEYBOARD FOR ONE-HANDERS. Handicap, April 1950, 3pp. (University of Washington, Seattle, Wash.).

A simplified typewriter keyboard for one-hand operation (one for the left and one for the right) is described. In designing the keyboard, the data from an earlier investigation of typewriting was used so that those keys used for 96.5 percent of all ordinary typing can be reached by extended reaches of the first and fourth fingers without the hand

leaving the "Gate Position." Procedures for securing the machine or for converting a standard machine are given. In addition, critical comments are made on the standard keyboard. I.

1958

Gambril, L.M., King, R.E., Stanton, C.I. & Gaffne, G.K. SYSTEMS ENGINEERING RELATING TO COMMUNICATIONS FACILITIES FOR THE COMMON SYSTEM OF AIR TRAFFIC CONTROL. FINAL REPORT TASK A PART 2 VOLUME 2 DESCRIPTION OF PROJECTION DISPLAY FOR DEMONSTRATION OF SEMI-AUTOMATIC AIR TRAFFIC CONTROL DATA COMMUNICATION SYSTEM. Contract DA 36 039 SC 64567, Dec. 1958, 141pp. Bell Telephone Laboratories, Inc., New York, N.Y.

An earlier report in this study of air traffic control described means by which existing equipments and known techniques could be integrated into a semi-automatic system of communications terminating in a dynamic display, both symbolic and pictorial, of the information needed for controlling air traffic. This report describes a demonstration of the dynamic nature of the end product of the first stage of the proposed system. The pictures used are appended. I.

2002

Rosenberg, N., Izard, C.E. & Hollander, E.P. MIDDLE CATEGORY ("?") RESPONSE: RELIABILITY AND RELATIONSHIP TO PERSONALITY AND INTELLIGENCE VARIABLES. ONR Proj. NR 154 098, Proj. Rep. NM 001 077 01 01, June 1953, 19pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To investigate the middle-category ("?") response on personality test items with respect to its reliability and relationship to personality and intelligence, three Guilford-Martin inventories were administered to 344 Naval Aviation cadets. Bernreuter tests were also available for 277 of the subjects. Personality trait scores on the Guilford-Martin tests, intelligence test scores, and years of schooling were used as independent variables. The number of "?" answers for each personality test provided four scores which were then correlated with each other and with each of the other variables. The findings are discussed in relation to possible scoring adjustments on personality tests. T. R 19

2003

Packard, J.M., Graettinger, J.S. & Graybiel, A. TEN YEAR FOLLOW-UP STUDY OF THE PHYSICAL STATUS OF 1000 AVIATORS: ANALYSIS OF THE ELECTROCARDIOGRAMS. Proj. NM 001 057.05.03, June 1953, 13pp. USN School of Aviation Medicine, Naval Air Station, Fla.

2004

The electrocardiograms of 1000 healthy aviators aged 20-30 were analyzed in 1940-42. After ten years, a follow-up study of the group was made. Re-examinations were made on 70 per cent of the group and their electrocardiograms analyzed. The effect of heart rate, age, weight, and blood pressure is discussed. Two cases of the Wolff-Parkinson-White syndrome, two instances of complete right bundle branch block, and one instance of complete left bundle branch block are discussed briefly. T. G. 1. R 16

2004

Niven, J. I. & Graybiel, A. RESIDUAL EFFECTS ATTRIBUTABLE TO THE SEMI-CIRCULAR CANALS FOLLOWING UNILATERAL LABYRINTHECTOMY IN MAN. Proj. NM 001 059 01 36, May 1953, 11pp. USN School of Aviation Medicine, Naval Air Station, Fla.

It has been established that angular acceleration is a sufficient stimulus for the semicircular canals. Whether a given canal may respond to rotation in either direction in its own plane was studied by exposing five unilaterally-labyrinthectomized, female subjects to clockwise and counter-clockwise rotations at speeds of one to ten revolutions per minute. The duration of the oculogyral illusion and of sensations of apparent bodily rotation following cessation of rotation were used as indicants of vestibular functions. G. R 18

2011

US Office of Armed Forces Information & Education & George Washington University. MEDICAL OFFICERS' OPINIONS ON PROFESSIONAL AND PERSONAL PROBLEMS OF ARMY SERVICE. US Dept. of Defense Rep. 137 & HUMRRO Rep. SR 3, July 1953, 150pp. US Office of Armed Forces Information & Education, Dept. of Defense, Washington, D. C. & Human Resources Research Office, George Washington University, Washington, D. C.

This report presents the results of an Army-wide survey of Medical Corps officers concerning their attitudes about military services and professional problems within the Medical Corps. Questionnaires were sent to a selected sample of 2,399 officers in mid-May 1952; 1,797 questionnaires were returned and form the basis of this analysis. The issues covered are: factual information on the officers; problems of professional and personal adjustment; attitudes towards assignments; interests in special assignments; promotion and classification; interest in future Army service; residencies, internships, and special training in Medical Corps; and comparisons of regular and reserve officers. T.

2013

Katz, D. THE SCRIPTOCHRONOGRAPH. Quart. J. exper. Psychol., Oct. 1948, 1(2), 53-56. (Department of Psychology, University of Stockholm, Sweden).

This article describes the scriptochronograph, an apparatus that can be used to analyze accurately the time sequence of writing. The writing is produced electrolytically on chemically prepared paper. A steel rod, connected to a direct-current source with a thin flexible wire conductor, is used for writing. The manner in which the apparatus is used is discussed. It is suggested that other types of manual movements could also be investigated with the scriptochronograph. 1.

2039

Institute for Research in Human Relations. PUBLICATIONS OF THE INSTITUTE FOR RESEARCH IN HUMAN RELATIONS. Fourth Revision, Jan. 1953, 4pp. Institute for Research in Human Relations, Philadelphia, Penn.

This is a list of publications available from The Institute for Research in Human Relations. The period covered is from 1949 through 1952. R 36

2066

Chang, S. H. & Wiren, J. SPEECH ANALYSIS. FINAL SCIENTIFIC REPORT. Contract AF 19(604) 2198, AFRCR TR 58 107, Feb. 1958, 36pp. Electronics Research Lab., Northeastern University, Boston, Mass.

This report summarizes the studies performed under a research contract directed toward the specification of important parameters in speech-band compression systems. In Chapter I the present status of the Formoder (Formant-Moment Recorder) is described. The Formoder is an experimental speech-band compression system which makes use of from five to seven narrow-band parametric channels to convey the information of speech. The principle assumptions, the instrumentation and some results of this approach are discussed. In Chapter II a study of the automatic identification of turbulent sounds is described. Experimental results which lead to the possible separation of unvoiced stops and fricatives are reported. T. G. 1.

2134

Pigg, L. D. PSYCHOPHYSICS OF PERIPHERAL COLOR PERCEPTION IN RELATION TO METHODOLOGY. Ph.D. Dissertation, 1955, 104pp. Ohio State University, Columbus, Ohio.

To compare two different methods of determining color fields, each of two subjects devoted 45 hours to observing colors

peripherally, using each of the two methods: 1) conventional technique, in which the color of a stimulus, being moved from peripheral to central portions of the visual field, is identified, and 2) a modified method of constant stimuli, in which the stimulus was exposed briefly and the subject made a judgment as to its color. The colors, red, blue, and green, were matched for brightness and saturation and were presented in three different sizes each. The four cardinal meridians were studied using method (1), followed by method (2) and finally by method (1). The data were compared and the usefulness of the two methods discussed. T. G. I. R 43

2457

Klare, G. R., Gustafson, L. M. & Mabry, J. E. THE READING INTERESTS OF AIRMEN DURING BASIC TRAINING. Contract AF 33(038) 25726, Proj. 507 011 0001, Res. Bull. 53 44, Nov. 1953, 10pp. USAF Human Resources Research Center, Lackland AFB, Tex. (University of Illinois, Urbana, Ill.).

The results of an administration of a reading interest check list to 398 Sampson Air Force Base basic airmen are presented in rank order from most to least interesting. The checklist contains 117 statements designed to cover the range of nonfiction reading interests. Limitations of the findings and ways in which they might be useful in training situations are pointed out. T. R 15

2293

Camp, R. T., Jr., Tolhurst, G. C. & Morili, S. N. THE INTELLIGIBILITY CHARACTERISTICS OF EARPHONES AND SMALL LOUDSPEAKERS IN THE MARK II, MODEL O FULL PRESSURE SUIT HELMET UNDER VARIOUS ALTITUDE, PRESSURE, AND VENTILATION CONDITIONS. Spec. Rep. 58 14, June 1958, 15pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To investigate the feasibility of replacing the earphones in a full pressure suit helmet (Mark II, Model O) with a loudspeaker system, intelligibility tests were performed on two types of transducers installed in the helmet. The tests were performed (under various altitude, pressure and ventilation conditions) on a trained observer wearing the full pressure suit and helmet. Speech levels, at which intelligibility thresholds for spondee words were obtained, were analyzed for both transducers under the various conditions. Other measurements taken were: level at which system starts distorting, sound pressure level of external ambient noise which results in an increase to noise level at ear, and the power rating of the amplifier driving the transducers. T. G. I.

2345

Flanagan, J. C., Lange, C., O'Hagan, Anne & Weislogel, Mary. CRITICAL REQUIREMENTS FOR RESEARCH PERSONNEL A STUDY OF OBSERVED BEHAVIORS OF PERSONNEL IN RESEARCH LABORATORIES. March 1949, 66pp. American Institute for Research, Pittsburgh, Penn.

The objective of this study was the identification and definition of the characteristics of effective scientific personnel and the development of a practical procedure for evaluating their success in carrying out their duties. Data were collected by means of the Critical Incident Technique. Descriptions were obtained of actual incidents of behavior that were deemed to be particularly effective or ineffective in performance of the job. A large and representative sample of 500 research workers supplied more than 2500 such incidents. A list of critical requirements was prepared from the incidents, using an inductive process involving a minimum of inference and judgment on the part of the investigators. An analytical study was made to check its applicability to workers in several fields. T. G. R 30

2353

King, B. G. (Chm.). AIRCRAFT EMERGENCY EVACUATION. A METHOD FOR EVALUATING DEVICES, PROCEDURES AND EXIT PROVISIONS. US Office of Aviation Safety, CAA, Washington, D. C.

To develop a standard method of evaluating emergency escape devices, procedures, and exit designs for commercial and military aircraft and to compile descriptive and quantitative data sufficient to provide a basis for acceptance of new devices and procedures, a frame-by-frame analysis of high-speed motion picture records of simulated emergency evacuations was made. Untrained subjects were tested on several escape devices that are carried by civil air transport and military planes. T. I.

2473

Trimble, O. C. THE RELATIVE ROLES OF THE TEMPORAL AND THE INTENSIVE FACTORS IN SOUND LOCALIZATION. Amer. J. Psychol., Oct. 1929, XLI, 564-576.

To determine the relative roles of the temporal and the intensive factors in sound localization, a series of experiments were conducted. The subjects were tested singly in a darkened sound-proof room; the task was to record the direction and angular displacement of the sounds. Five different experiments were reported: 1) localization as a function of intensive differences, 2) as a function of temporal differences, 3) with intensive differences apposed with a temporal

2499

difference, 4) with temporal differences ap-
posed with an intensive difference, and 5)
with both factors varied together in the
same direction. Theoretical interpretations
of the findings are offered. T. 1. R 20

2499

Townsend, C. L. NEW ALL-PURPOSE
FILM LEADER. J. SMPTE, May 1951, 56,
562-567.

A new all-purpose film leader design,
commonly called "The Society Leader," is
described, and its history, development,
tests, and uses to date are discussed. A
proposal is made for its further application
to motion picture prints of all types and for
all services. 1.

2502

Coleman, P. D. AUDITORY DISTANCE
LOCALIZATION AND STIMULUS FAMIL-
IARITY. Proj. 6 95 20 001, Task T 1. Rep.
384, April 1959, 6pp. USA Medical Research
Lab., Fort Knox, Ky.

To investigate changes in performance
in an auditory distance localization situation
as a function of opportunity to become famil-
iar with the characteristics of the stimulus,
subjects were confronted with a column of
14 loudspeakers extending away in a median
plane. The nearest speaker was five feet
from subject and the others were at succe-
sive two-foot separations. Stimuli were
one-second bursts of wide-band random
noise with which the subjects were presum-
ably unfamiliar. Subjects received 100 trials
in identifying the loudspeaker that served as
a sound source. Distance judgments and
errors were analyzed for learning effects.
T. G. R 6

2506

Connor, D. S. FLIGHT INVESTIGA-
TION OF FLIGHT DIRECTOR SYSTEMS
FOR LIGHT AIRCRAFT. RDO X 203 18,
Tech. Note WCT 54 30, May 1954, 26pp.
USAF Directorate of Flight and All-Weather
Testing, Wright-Patterson AFB, Ohio.

This report concerns an investigation
of improved flight information presentation
for Army liaison aircraft that are required
to engage in instrument flight. An installa-
tion of the Collins Integrated Flight System
was investigated as representative of flight
director systems. Pilots were required to
fly a special flight pattern consisting of
omnirange homing, radial interception, and
low approaches or Instrument Low Approach
System. Ground-tracked approaches were
also made. Pilot opinion and accuracy of
the recorded approaches were analyzed. A
comparison was made with a light-weight
automatic pilot and approach coupler.
G. 1. R 2

2523

Skeen, J. R. COMPARISON OF THE
OMNI BEARING INDICATOR AND THE
RADIO MAGNETIC INDICATOR IN SHORT
RANGE NAVIGATION. Contract N6ORI
71(16), SPECDEVCEN Proj. 20 L 1, Tech.
Rep. SPECDEVCEN 71 16 13, March 1955,
25pp. USN Special Devices Center, Port
Washington, N. Y. (University of Illinois,
Urbana, Ill.).

To compare two short-range navigation
instrument displays (the Radio Magnetic
Indicator and the Omni Bearing Indicator)
for accuracy of use by pilots in navigation,
16 experienced pilots were tested. Five
navigation problems were flown by the pilots
in a 1-CA-1 Link trainer; one half of the
subjects used one display, the other half used
the other one. Performance was scored in
five different ways and comparisons made
between the two groups for each score. T.

2547

Swire, E. A. (Dir.). PLASTIC
MATERIALS FOR VISION DEVICES.
FINAL REPORT. Contract DA 29 089 ORD
36437, Proj. C 054, June 1954, 9pp. Armour
Research Foundation, Illinois Institute of
Technology, Chicago, Ill.

To determine methods for producing a
plastic periscope with a resistance to abra-
sion approaching that of glass, three mate-
rials (silicon monoxide applied as a coating
by vacuum deposit, and optically clear
elastomer such as methyl polyacrylate, and
a commercial abrasion-resistant plastic such
as allyl diglycol carbonate) were investigated.
Two types of periscopes were prepared from
these materials, illustrating the feasibility
of production. 1.

2582

Carmichael, L. & Cashman, Helen.
A STUDY OF MIRROR-WRITING IN RELA-
TION TO HANDEDNESS AND PERCEPTUAL
AND MOTOR HABITS. J. gen. Psychol.,
1932, 6, 296-329. (Psychology Laboratory,
Brown University, Providence, R. I.).

In this paper studies of seven typical
cases of individuals showing spontaneous mir-
ror writing are reported. After the case his-
tories are given, certain general conclusions
are offered in regard to the phenomenon, its
development, and its significance for not only
the problem of handedness and as a clinical
system but also for understanding the acqui-
sition of motor and perceptual habits. 1. R 80

2590

McNiven, M. THE EFFECTS ON
LEARNING OF THE PERCEIVED USEFUL-
NESS OF THE MATERIAL TO BE LEARNED.
Contract N6ONR 269, SPECDEVCEN Proj.
20 E 4, Tech. Rep. SPECDEVCEN 26; 7

54, Aug. 1955, 33pp. USN Special Devices Center, Port Washington, N. Y.

To discover whether material that was perceived to be useful is learned better than material not so perceived, a rating form and an attitude scale were developed and tested on 473 senior high school subjects. Three instructional films (atomic energy, first aid, knowledge of car parts and construction) were selected as the learning task. Both temporal goal distance (need to use learning) and psychological goal distance (perceived usefulness of learning) were varied by means of varying instructions to the five groups of subjects. Analysis was based on attitude scale, ranking form, pre- and post-test scores, and intelligence test scores. Implications of the results for learning theory and for the construction of training films are discussed. T.

2661

Ansbacher, H. L. MURRAY'S AND SIMONEIT'S (GERMAN MILITARY) METHODS OF PERSONALITY STUDY. J. abnorm. soc. Psychol., Oct. 1941, 36(4), 589-592. (Brown University, Providence, R. I.).

Two methods of study of the total personality are compared: one by Murray developed in the United States and one by Simoneit developed in Germany. Comparisons of principles and procedures are made to show the many similarities and some of the differences. One of the major differences is the primary objective of the two men: Murray wants primarily to make a contribution to the science of personality study, while Simoneit merely wants to use all available means for effective selection of military personnel. R 7

2728

Bartlett, N. R. DESCRIPTION OF AN ABSTRACT OF THE SERVICE RECORD FOR ANALYSES OF EXAMINATIONS OF EXPERIENCED SUBMARINE PERSONNEL RECEIVED FOR REASSIGNMENT. Res. Proj. X 596 (Sub. 128), MRL Rep. 86, Prog. Rep. 1, Jan. 1946, 3pp. USN Medical Research Lab., Naval Submarine Base, Conn.

A record form is described which was developed in an effort to permit a systematic accounting of examinations of experienced submarine personnel received at the New London Submarine Base for reassignment. Periodic accountings were allowed for by the use of punched cards. The abstract record is appended. I.

2729

Bartlett, N. R. AN EVALUATION OF THE OFFICER CLASSIFICATION TEST AS A DEVICE FOR SELECTING OFFICER CANDIDATES FOR SUBMARINE SCHOOL. FINAL REPORT. Res. Proj. X 530 (Sub. 107). MRL Rep. 67, July 1945, 17pp. USN Medical Research Lab., Naval Submarine Base, Conn.

In this paper the different sections of the Officer Classification Test are evaluated in terms of a criterion of success in learning the duties of a submarine officer. Grades from two classes of 238 and 259 men respectively are used. The results are also analyzed in terms of the effect of submarine training received prior to entering officers training. A follow-up study is discussed. T.

2730

Bartlett, N. R. AN INVESTIGATION OF THE BILLET QUALIFICATIONS BLANK (NAVPERS 16418) FOR ITS SUITABILITY WITH COMBAT-EXPERIENCED CANDIDATES FOR SUBMARINE TRAINING. FINAL REPORT. Res. Proj. X 598 (Sub. 129), Jan. 1946, 12pp. USN Medical Research Lab., Naval Submarine Base, Conn.

This paper extends the research on the Billet Qualifications Blank (a personality test designed to identify neurotic individuals) by adding data on the effectiveness of the test in screening combat-experienced candidates for submarine duty. Scores for 198 such candidates were obtained on the Billet Qualifications Blank and of two sections of the Enlisted Personal Inventory. The success of the two tests in predicting certain criterion examination classifications is discussed. T.

2754

Kabrick, R. P. PREDICTIVE VALUE OF A REVISED FORCED CHOICE FORM OF THE MANIFEST ANXIETY SCALE. STUDIES OF INFLUENCE OF MOTIVATION ON PERFORMANCE IN LEARNING. Contract N9 ONR 93802, Proj. NR 154 107, Tech. Rep. 2, Aug. 1954, 25pp. Dept. of Psychology, State University of Iowa, Iowa City, Iowa.

This study was concerned with the construction and evaluation of a revised forced-choice form of the reworded Taylor Manifest Anxiety Scale. The method of construction followed the general procedure used in the development of a forced-choice form of the original scale and was designed to reduce possible tendencies of the subject to consider the social desirability of particular responses. Data were obtained from administration of the revised form and Taylor's reworded A-scale to 470 subjects. Four groups were then chosen to represent the extremes of both scales to participate in a differential eyelid conditioning situation. The conditioning results were analyzed in an effort to determine which test best predicted the anxious individual. T. R 29

2906

Garvey, W. D., Knowles, W. B. & Newlin, E. P. PREDICTION OF FUTURE POSITION OF A TARGET TRACK ON

FOUR TYPES OF DISPLAYS. Proj. NR 592 030, NRL Rep. 4721, April 1956, 9pp. USN Research Lab., Washington, D.C.

Tracking on a search radar scope or vertical plotting board often requires the prediction of future positions of a target based on its past history. Accuracy of prediction was measured in terms of deviations in range and bearing between estimated and actual position plots on four different displays: linear and non-linear Plan Position Indicators, linear and non-linear B-scan. Sixty problems were presented to 32 subjects. Signals were presented at the rate of six per minute; after the second signal, the subject indicated the estimated position of the next signal by a mark, and so on through the track. Accuracy of performance was compared for the four displays. T. G. I. R. 4

2913

Immergluck, L. THE ROLE OF SET IN PERCEPTUAL JUDGMENT. J. Psychol., 1952, 34, 181-189. (Dept. of Psychology, Sarah Lawrence College, Bronxville, N.Y.).

Some aspects of the role of set in the area of perceptual judgment were investigated --specifically, the extent to which simple perceptual responses are subject to routinization and how such routinization will affect perceptual judgment. Two series of cards, each containing a pair of simple geometric designs (one of which was a more perfect geometric example), were prepared; one series contained the more perfect figures on the right side, the other used a mixed order. The final card for both series placed the more perfect figure on the left. One group of 16 subjects responded to the set series, the other to the mixed series. Errors on the final card were recorded and compared in terms of the initial questions posed. T. I. R. 15

2951

Gordon, D. A., Zagorski, H. J. & Zeidner, J. THE DEVELOPMENT OF EXPERIMENTAL MESOPIC VISUAL ACUITY TESTS, Proj. 29535100, PJ 3513 01, PRB Res. Note 15, April 1953, 23pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

Six tests of mesopic (moonlight) visual acuity were assessed in terms of test-retest reliability and score distribution. This information is to aid in selecting mesopic visual acuity tests for a later validation study. The six tests (New Army Snellen, Bausch and Lomb Checkerboard Variable Grid, Modified Landolt Ring, Line Resolution, Ortho-Rater New Army Snellen, and Ortho-Rater Modified Landolt Ring) were administered at mesopic brightness level to 117 soldiers and re-administered a week later. On the basis of the results, three of the tests were revised to increase the

number of items and to include sufficient numbers of above-threshold items. T. G. I. R. 5

2956

King, E. J., Snider, A. E. & Hamburger, F., Jr. A PHYSICAL COMPARATOR FOR THE COLOR TEMPERATURES OF INCANDESCENT LAMPS. Contract N5 OR1 166, T.O. 1., SDC Hum. Engng. Proj. 20 F1, Proj. NR784 001, Tech. Rep. SDC 166 1133, July 1951, 15pp. USN Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Baltimore, Md.).

An apparatus for evaluating the color temperatures of incandescent tungsten lamps by physical comparison techniques is described. A red-to-violet ratio method of establishing the effective slope of the radiometric function is utilized. The apparatus uses a 931-A photomultiplier to receive radiations from the "standard" and "unknown" lamps through red and violet filters sequentially. Resultant oscilloscope patterns are judged for equality. The advantages of this method are discussed. G. I. R. 15

3021

Fleishman, E. J. & Spratte, J. G. THE PREDICTION OF RADIO OPERATOR SUCCESS BY MEANS OF AURAL TESTS. Proj. 7700, Task 77011, AFPTRC TR 54 66, Nov. 1954, 13pp. USAF Personnel & Training Research Center, Lackland AFB, Tex.

This paper describes an exploratory study into the utility of some auditory-perceptual tests (not now used by the Air Force) for predicting proficiency in telegraphic code reception. The tests evaluated included measures of discrimination of pitch, of loudness, of rhythm, of time, and of timbre; a test of tonal memory, and two new experimental tests. The criterion of success used was speed of code reception (number of groups per minute) at the end of the fourteenth week of training. The tests were administered to 400 entering radio operator trainees. The test scores were analyzed by correlational techniques. T. R. 9

3047

Timberlake, P. W. EVALUATION OF CELESTIAL NAVIGATION FOR FIGHTER PILOTS. FINAL REPORT. Proj. APG SAS 98 A, Sept. 1953, 51pp. USAF Air Proving Ground Command, Eglin AFB, Fla.

A celestial navigation procedure for fighter pilots, which requires celestial pre-computations geared to the dead reckoning flight plan, is described in this report. The operational aspects of the procedure, its organizational impact, and its capabilities are analyzed. Recommendations are included. T. G. I.

3050

Berkshire, J.R. FIELD EVALUATION OF A TROUBLESHOOTING AID. Proj. 7714, Task 77253, AFPTRC TR 54 24, June 1954, 8pp. USAF Personnel & Training Research Center, Lackland AFB, Tex.

The development and preliminary evaluation of a set of trouble-shooting materials by means of which a mechanic can trace symptoms of malfunction to the underlying cause or causes are discussed. The experimental materials included color-coded schematics of the bomb-release chain of the AN/APQ-24 radar set with written directions called "trouble locators". Six different malfunctions were studied by 24 mechanics, one group of whom were experienced and another with little or no experience. Each mechanic identified two malfunctions, using his own methods for one and the trouble-shooting materials for the other. Length of time and number of components removed were compared for the two methods and for the two groups. T. R. 4

3092

Davis, H., Parrack, H.O. & Eldredge, D.H. HAZARDS OF INTENSE SOUND AND ULTRASOUND. Ann. Oto-, Rhino-, Laryngology, Sept. 1949, 58(3), 732-738.

This paper reviews present evidence for the hazards to hearing of air-borne ultrasonic vibrations. Evidence for specific effects of these vibrations on the nervous system and sense organs is considered. High intensity sound hazards are discussed and various critical levels pointed out. Mild stimulation that gives rise to subjective feelings of fatigue, annoyance, irritation, and the like are mentioned. G. R. 5

3100

Davis, T.R.A., Johnston, D.R. & Bell, F.C. SOME CHARACTERISTICS OF SHIVERING IN MAN. Proj. 6 64 12 028, Task USAMRL T 1, MEDEA, Rep. 383, May 1959, 14pp. USA Medical Research Lab., Fort Knox, Ky.

To determine the relative roles of core and peripheral temperatures not only regarding the stimulation of shivering but also concerning the maintenance and regulation of shivering subsequent to its onset, ten human subjects (22 to 26 years of age) were studied. After one hour of stabilization at room temperatures (30 degrees C) in supine position on mesh cot and wearing shorts, each subject was wheeled into a cold room (14 degrees C) for one hour. Measurements included motor activity, rectal and surface temperatures in both warm and cold rooms. Immersion experiments used sea water. Onset of shivering was analyzed in relation to body size, surface area, latitude of origin, skin temperatures and rectal temperatures. The shivering pattern was also studied. T. G. 1. R. 13

3103

Day, R.H. & Baxter, J.R. A COMPARISON OF TWO TYPES OF VISUAL APPROACH AID. Note ARL/HE 4, Jan. 1959, 38pp. Dept. of Supply, Aeronautical Research Labs., Melbourne, Australia. (Dept. of Psychology, University of Sydney, Sydney, Australia).

To compare the principles of glidepath guidance used in the British Angle of Approach Indicator and the Australian Precision Visual Glidepath, twelve experienced airline captains made three approaches on each system during conditions of clear visibility on moonless nights. Preferences under a variety of conditions and from a number of aspects were determined by questionnaire; flight profiles were also recorded. The data were analyzed for differences between the two systems. T. G. 1. R. 5

3104

Dearborn, W.F., Johnston, P.W. & Carmichael, L. IMPROVING THE READABILITY OF TYPEWRITTEN MANUSCRIPTS. Proc. nat. Acad. Sci., Oct. 1951, 37(10), 670-672. (Tufts University, Medford, Mass.).

This paper reports some of the results from an investigation of ways to improve the readability of typewritten manuscripts. Some of the features which were tried out experimentally were 1) the use of a "peak stress" format (capitalizing in each sentence the word to which the author would give maximum oral stress), 2) two-column arrangement, 3) single-spaced lines, 4) other spatial arrangements which break up the article into more comprehensible units of thought, and 5) blackening (by retyping over original) certain sections deemed by the writer to be of particular importance. R. 2

3105

Deily, W.H., Glassman, I. & Houghton, D.B. A DYNAMIC AIRCRAFT SIMULATOR FOR STUDY OF HUMAN RESPONSE CHARACTERISTICS. Contract AF 33(038) 10420, Final Rep. F 2169, Sept. 1952, 94pp. Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.

This report covers the design and construction of a dynamic simulator of an aircraft in flight with which "human frequency responses" to visual signals may be measured for the purpose of determining optimum characteristics of an aircraft's controls. The simulator comprises an aircraft cockpit, a program unit that presents visual input stimuli on a cathode ray tube in view of the pilot, an electronic analog computer that computes the aircraft equations of motion and resultant stimuli (target) motions, and a recorder for pilot responses and other desired quantities. Validation of the simulator is given in a separate report. T. I.

3107

3107

Doelling, N. & Kryter, K.D. CHARACTERISTICS OF NOISE PRODUCED BY SEVERAL CONTEMPORARY ARMY WEAPONS. Contract DA 49 007 MD 985, Job 12,025, Rep. 630, March 1959, 51pp. Bolt Beranek and Newman, Inc., Cambridge, Mass.

Measurements have been made of the noises associated with the firing of an M-1 rifle, 30 and 50 caliber machine guns, a 76 and 90 millimeter gun and a 105 millimeter howitzer. The noises are described in terms of maximum instantaneous peak value, duration, rise time, and frequency spectrum. The distributions of the above parameters in and around the several weapons have also been investigated. Recommendations are made concerning efficient data recording techniques. T. G. I.

3108

Duddy, J.H. & Dempsey, C.A. LIGHT-WEIGHT SEATING: DESIGN RESEARCH AND DEVELOPMENT OF A NET SEAT FOR PROJECT MANHIGH. ONE OF A SERIES OF STUDIES PERTAINING TO CREW COMPARTMENT HABITABILITY FOR EXTENDED MISSIONS. Contract AF 33(616) 3068, Proj. 7222, Task 71747, WADC TR 58 307, Dec. 1958, 41pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University, Medford, Mass.).

This report describes the design research and development of a light-weight nylon net seat for Project MANHIGH (manned balloon flights in the hostile space-equivalent environment for extended periods of time). Experiments were conducted to determine the ways in which the complex contours of a continuous body supporting surface could be generated with nylon net. Three independent factors, found to affect the curvature of the surface, were varied empirically to develop an experimental seat design. An aluminum and nylon net facsimile of the proposed seat was constructed and evaluated during flight. T. I. R 9

3109

Staats, A.W., Staats, Carolyn K. & Heard, W.G. PSYCHOLOGICAL PROCESSES IN LANGUAGE COMMUNICATION. LANGUAGE CONDITIONING OF MEANING TO MEANING USING A SEMANTIC GENERALIZATION PARADIGM. Contract NONR 2305 (00), Tech. Rep. 4, May 1958, 8pp. Arizona State College, Tempe, Ariz.

This study tests the hypothesis that a word meaning response can be conditioned to the meaning response of another word. Two types of stimuli were used: 1) words presented on a screen (conditioned stimulus--CS) and 2) words presented orally (unconditioned stimulus--UCS). The visually presented words were shown 14 times in random

order. On each presentation the CS-word was paired with a different UCS-word. The CS-words ROCK and CARPET were always paired with UCS-words of positive or negative evaluative meaning. The order of pairing was reversed for two groups. Finally, all subjects rated a series of words including STONE and RUG on a semantic differential scale of pleasant-unpleasant. The scores were analyzed for mediated conditioned meaning to synonym words. T. R 12

3110

Solomon, P., Kubzansky, P., Leiderman, P.H., Mendelson, J.H., et al. SENSORY DEPRIVATION. *Science*, Jan. 1959, 129(3343), 221-223. (Psychiatric Research Lab., Boston City Hospital, Boston, Mass.).

This note presents a summary of a "Symposium on Sensory Deprivation" which was held at the Harvard Medical School in Boston on 20 and 21 June 1958. The working group represented men from a wide variety of disciplines who were working with problems of sensory deprivation, isolation, and confinement. Findings were reported relevant to the effects of deprived or restricted environments upon intellectual functions, opinions, attitudes, perceptual performance, reaction time, electroencephalograms, and physiological reactivity, as well as upon personality and emotions. Full proceedings are to be published.

3131

Cotzin, M. & Dallenbach, K.M. "FACIAL VISION: THE ROLE OF PITCH AND LOUDNESS IN THE PERCEPTION OF OBSTACLES BY THE BLIND. *Amer. J. Psychol.*, Oct. 1950, LXIII, 485-515. (University of Texas, Austin, Tex.).

This study, the last of three investigations on the perception of obstacles by the blind, concerned the auditory dimension (pitch or loudness) involved in the perception. Four subjects (two blind and two with normal vision wearing a blindfold) were tested on their ability to perceive an obstacle under the following conditions: 1) a continuous sound (thermal noise containing all audible frequencies at high level intensity) was moved toward an obstacle at a rate controlled by the subject; and 2) a continuous sound (pure tones varying by octave relationship from 125 to 8000 cycles and at 10,000 cycles) was moved as before. Stimulus-limits were determined for each subject at distances varying from zero to six feet from the wall and the data were analyzed for the critical dimension. T. G. I.

3132

Danaher, J.W., Coiman, K.W. & Courtney, D. THE SIMULATOR PILOT IN A DYNAMIC AIR TRAFFIC CONTROL SIMULATOR: AN ACTIVITY ANALYSIS. INTERIM REPORT. Contract FAA/BRD

4V-17

3153

27, Proj. N, Rep. 25, Feb. 1959, 54pp. Courtney and Company, Philadelphia, Penn.

A dynamic Air Traffic Control (ATC) system simulator is currently being developed for the Federal Aviation Agency, Bureau of Research and Development. This report is concerned with an analysis of the simulator operator's activities. Included are a detailed description of the operator's task and its relationship to the over-all simulator system for personnel concerned with the conduct of ATC studies, an optimal set of procedures and sequences for accomplishing the various operations, a basis for a detailed specification of the requirements of the task as an aid in selecting operators, a basis for determining training needs and criterion measures of proficiency, and feedback for future simulator development to improve simulator console design. T. I. R 10

3137

Davis, T.R.A., Johnston, D.R. & Bell, F.C. SEASONAL ACCLIMATIZATION TO COLD IN MAN. Proj. 6 64 12 028, Task USAMRL T 1, MEDEA, Rep. 386, May 1959, 7pp. USA Medical Research Lab., Fort Knox, Ky.

To determine if the physiological changes induced by acclimatization in animals also takes place in man, six subjects (22 to 26 years of age) were studied for a period from October through February. Each subject received one hour of deliberate cold exposure (room temperature, 14 degrees C) per month preceded by one hour stabilization to 30 degrees C. Measurements for both conditions included resting metabolic rate, rectal and skin temperatures, and baseline motor activity. Shivering activity was measured by integrating muscle action potentials from right thigh. Heat acclimatization was obtained by eight-hour daily exposures to 49 degrees C, for three weeks with 20 minutes of exercise each hour. R 7

3149

Stingely, N.E. AEROMEDICAL EVACUATION LITTER PATIENT SAFETY HARNESS. Proj. 6354, WADC TR 57 6, Jan. 1957, 68pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

The purpose of this study is to recommend specifications for a mechanical restraining device that will provide the necessary restraint for the safety of injured personnel and psychotic litter patients during air evacuation. The medical and operational requirements for such a device were determined and tentative design specifications evaluated in a series of tests. A prototype model was constructed and evaluated. Final design specifications were developed for a proposed aeromedical safety harness for the evacuation of litter patients. T. G. I. R 19

3150

Sutro, P.J., Ward, H.O. & Townsend, C.A. HUMAN VISUAL CAPACITIES AS A BASIS FOR THE SAFER DESIGN OF VEHICLES. ANNUAL REPORT. Contract AFEB 6 61 01 004, March 1958, 56pp. CAA Medical Research Lab., Columbus, Ohio.

This report summarizes accomplishments during the year 1957 on a research project on human visual capacities as a basis for safer design of vehicles. The total behavioral field of vision has been studied by obtaining fields of fixation, standard fields of vision, fields with intermediate and maximum eye deviation, and field of maximum head rotations. Apparatus was developed and constructed for measuring peripheral acuity and form perception in a dynamic situation. Visibility areas of 16 contrasting vehicles were measured, analyzed, and rated. An analysis of conspicuity characteristics of motor vehicles was made. A general literature survey was completed. G. I. R 3

3151

USAF Air Technical Intelligence Center. SELECTED ARTICLES FROM SOVETSKAYA AVIATSIYA (SOVIET AVIATION). 4 JANUARY 1957 THRU 5 JUNE 1957. F TS 9290/III, 1957, 148pp. USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio.

This volume presents selected articles from Soviet Aviation. The following general topics are covered by one or more of the articles: training, bombing techniques and instruments, fire control methods and systems, rocketry, helicopters, night vision (for flight and gunnery), high altitude fighting techniques, and anti-atomic safety measures. R 27

3153

Tiedeman, D.V., Scheffler, I. & Starr, J. PRODUCTION, SPEED, ACCURACY AND SAFETY IN THE MAINTENANCE OF LONG-RANGE AIRCRAFT: A CONCEPT AND AN ANNOTATED BIBLIOGRAPHY. Contract AF 41(657) 77, Proj. 45, Suppl. Agreement 2(57 213), Aug. 1957, 130pp. Educational Research Corporation, Cambridge, Mass.

This document presents a summary of evidence relevant to the determination of dimensions that are psychologically meaningful to the performance of the jobs of 1) pre- and post-flight line maintenance, and 2) servicing of long-range aircraft. An over-all framework was developed for summarizing the literature: 1) work pattern, 2) physical environment, 3) social environment, and 4) man-selection and classification, training, and motivation. Nearly 180,000 abstracts and titles from the Psychological Abstracts were examined and classified as

core, peripheral, or irrelevant. All articles of the first two classifications were read and abstracted (not included here). A memorandum on human engineering implications in the maintenance of nuclear-powered equipment is appended. 1. R 500 (approx.)

3154

Stansfield, R. G. FITTING THE JOB TO THE WORKER. Nature, June 1957, 179, 1284-1285.

The proceedings of an international seminar, "Fitting the Job to the Worker," is summarized in this note. About 70 people, comprising physiologists, psychologists, engineers and industrial physicians, from 13 European and North American countries attended. The aim was to bring out what each had to contribute to the scientific study of the individual worker as he uses his tools and equipment and as he is affected by his immediate environment, and how such knowledge can be applied to the design of machine and workplace, either to increase the effectiveness with which the job is done, or to improve the worker's well-being.

3155

Vanderplas, J. M., Debons, A. & Crannell, C. W. LUMINANCE AND "EXPECTANCY" AS DETERMINANTS OF RESPONSE TIME TO A LIGHT SIGNAL. Proj. 7184, Task 71580, WADC TN 58 292, Jan. 1959, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report describes an experimental evaluation of two factors affecting the speed with which human operators respond to a warning light: intensity of the light signal and delay interval between an auditory alerting and the light signal. Four levels of intensity (from 1.4 to 17,616 foot lamberts) and seven variations from a standard ten-second delay (4, 6, 8, 10, 12, 14, 16, or 18 seconds) were used. The subject's task was to release a response switch upon appearance of the signal; there were 72 subjects. The reaction time data were analyzed as functions of the two factors under consideration. T. G. R 3

3157

Wald, G. & Griffin, D. R. THE CHANGE IN REFRACTIVE POWER OF THE HUMAN EYE IN DIM AND BRIGHT LIGHT. J. opt. Soc. Amer., May 1947, 37(5), 321-336. (Harvard University, Cambridge, Mass.).

This paper is concerned with an examination of a reported phenomenon that the human eye behaves as though relatively short-sighted in dim lights, its magnitude, and its causes. Measurements of telescope settings by 21 observers in daylight and in dim light were made and differences in setting compared to find the magnitude of the effect. Factors associated with an expanded

pupil, the chromatic aberration of the eye, and accommodation of the eye in dim light were investigated. The findings are discussed in relation to the differential settings of optical instruments in bright and in dim lights. T. G. 1. R 20

3158

Ward, J. H., Jr. USE OF A DECISION INDEX IN ASSIGNING AIR FORCE PERSONNEL. Proj. 7719, Task 17112, WADC TN 59 38, April 1959, 17pp. USAF Personnel Lab., Lackland AFB, Tex.

Those responsible for the distribution of Air Force personnel need to make decisions about the estimated worth of individuals in various jobs and about the assignment of individuals in a manner that will bring about over-all effectiveness of the Air Force. This paper presents techniques to aid in arriving at such decisions. A system is developed that will provide a Decision Index for each individual in each proposed job assignment. Methods are described of computing and arraying the indexes for use in determining personnel assignment. T. R 6

3159

Webb, S. A COMPARATIVE STUDY OF SIX KEYSSET ENTRY UNITS. PO 06401, NE 091300 4(NEL N5 5), NEL Rep. 902, Feb. 1959, 12pp. USN Electronics Lab., San Diego, Calif.

Two experiments were conducted to compare the relative effectiveness of six alternative keyset entry units involving 64 items of information. In the first experiment four of the units were found superior in terms of perceptual motor performance; in the second experiment these four units were studied further in a simulated operational situation with greater perceptual and conceptual complexity. Recommendations are made for incorporating the superior keyset entry unit in data-handling systems which use current conventional techniques. T. 1. R 10

3161

Weinberg, J. W. DOUBLE-WALLED FACEPIECES MA-1A ALTITUDE HELMET. Contract AF 33(616) 3774, Proj. 7164, Task 71834, WADC TR 58 643, March 1959, 56pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Pioneer Scientific Corporation, Great Neck, N. Y.).

This report describes the design and construction of a double-walled lens to be used as face pieces on MA-1A altitude helmets. The problem was to prevent water vapor condensation on the inner surface under conditions prevailing in sustained flight at very high altitudes and to delay such condensation in emergency loss of plane canopy or ejection in such a way as to provide unimpeded vision to the flier during the probable duration of the emergency or of free fall

through the upper atmosphere. The limitations of such a device are analyzed and laboratory tests of the lens are described. T. R 7

3162

White, W. A., Jr., Welham, W. C. & Williams, S. B. VALIDATION OF PHYSICAL FITNESS TESTS BY MEANS OF MARKSMANSHIP PERFORMANCE UNDER CONDITIONS OF ACUTE FATIGUE. M & S Res. Proj. X 234, KPI 36/All(P-1)X 234, May 1944, 34pp. USMC Medical Field Research Lab., Camp Lejeune, N. C.

To validate four physical fitness tests (step-up test, Army Air Forces physical fitness test, Schneider test, and a tilt table test), a group of 104 Marines and Hospital Corpsmen performed each of the tests. On the day following the tests a 60-hour fatigue test was administered beginning and ending with firing four strings of 16 shots, using the M-1 rifle in the sitting position, with the target at 300 yards. Scores on the four tests were compared and correlated with the improvement or decrement in firing the M-1 rifle after the fatigue test. T. R 5

3163

USA Board NR6. EVALUATION OF THE LEAR NATURAL ATTITUDE FLIGHT INDICATOR IN AN H-19 HELICOPTER. (DA PROJ NR UNKNOWN; RDB TECH OBJ UNKNOWN). Proj. NR AVN 2056, July 1956, 5pp. USA Board NR6, CONARC, Fort Rucker, Ala.

To evaluate the Lear Natural Attitude Flight Indicator under simulated instrument conditions in H-19 Helicopters, Army aviators with varying amounts of instrument training in fixed wing and rotary wing aircraft flew the H-19 Helicopter in which the instrument had been installed. Instrument installation and maintenance difficulties were recorded. Based on the trials a list of deficiencies and suggested modifications were drawn up and are included here. I.

3168

Witkin, H. A. STUDIES IN GEOGRAPHIC ORIENTATION. Yearb. Amer. phil. Soc., 1946, 152-155. (Brooklyn College, Brooklyn, N. Y.).

A series of experiments investigating the way in which orientation toward the north south-east west axes of space is normally maintained is summarized. For most of the experiments the ability of the subject to remain oriented through a series of movements was tested. The variables were as follows: without the aid of vision, with a visual frame of reference, and with suggestion of illusory body motion (postural autokinetic effect). A paper-and-pencil test was devised to investigate further nature of individual differences in orientation.

3169

Witkin, H. A. THE EFFECT OF TRAINING AND OF STRUCTURAL AIDS ON PERFORMANCE IN THREE TESTS OF SPACE ORIENTATION. Rep. 80, Oct. 1948, 85pp. Division of Research, CAA, Washington, D. C. (Brooklyn College, Brooklyn, N. Y.).

To determine the effect of training and of structural aids on performance in three tests of space orientation (Stability of Orientation Test, Dark-Room Test, and Rotating-Room Test), each test was administered twice to 196 subjects. Four groups of 49 subjects each were tested under the following conditions: 1) training given between first and second administrations, 2) structural aids varied between the two administrations, 3) additional testing given between administrations, and 4) test and retest with no interpolated activity. The test data were analyzed by methods of covariance to determine the effect of the differential treatment. T. I. R 8

3173

Wokoun, W. & Chaikin, G. A GUIDE TO COLOR BANDING FOR INDICATORS (METERS). Proj. TUI 2031, Tech. Memo. 2 59, March 1959, 9pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

This report presents a rationale for color-coded banding of meters. The principles set forth are illustrated and swatches of the four colors that are considered maximally discriminable are given. I.

3179

Woodward, A. A., Jr., Cornish, E. R., Jr., Blevins, W. V., Cain, S. M., et al. PHYSIOLOGICAL EVALUATION OF A DIFFUSION BOARD PROTECTIVE SHELTER (U). Proj. 4 08 02 019 01, Rep. 2177, Sept. 1957, 48pp. USA Chemical Warfare Labs., Army Chemical Center, Md.

To ascertain whether human occupants of a diffusion board protective shelter are subjected to intolerable physiological stresses during occupancy up to two days, a prototype shelter was constructed and evaluated. A total of 18 subjects served in nine different tests. Physiological measurements were body temperatures, heart rates, respiratory activity, metabolic rates (calculated), and observations by an inside observer of various activities and signs of developing strain. Environmental data collected were air temperatures, relative humidity, barometric pressure, and gas composition of shelter air and outside air. These data were analyzed in terms of tolerable conditions of carbon dioxide concentration and temperatures. T. G. I. R 23

3180

Ziegenruecker, G. H. & Magid, E. B. SHORT TIME HUMAN TOLERANCE TO

SINUSOIDAL VIBRATIONS. Proj. 7231, Task 71786, WADC TR 59 391, July 1959, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

Short time human tolerance criteria for sinusoidal vibration from one to 15 cps were determined using ten healthy male subjects ranging in age from 23 to 34 years. At each frequency, the amplitude was increased at a constant rate from zero to the point where the subject stopped the run because he thought that further increase might cause actual body harm. Lower and upper tolerance limits were established. Subjective tolerance limits were found to be caused by one or more of seven specific sensations or symptoms. Physiological observations during vibration exposure were also made. T. G. I. R 15

3186

Carmichael, L. PERCEPTUAL ASSIMILATION IN A STEREOSCOPIC ILLUSION. Amer. J. Psychol., Jan. 1950, 63(1), 112-113. (Tufts University, Medford, Mass.).

This note describes a stereoscopic illusion observed when observing a scene in nature with one eye and with the other eye a transparency of the same scene. The transparency had two objects (boats) not in the natural scene at the moment of observation. A perceptual assimilation of the boats into the natural scene was noted. The significance of this phenomenon for an understanding of distance perception is suggested.

3192

USAF Operational Applications Lab. BIBLIOGRAPHY OF TECHNICAL PUBLICATIONS. Sept. 1955, 22pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C.

This bibliography of Technical Notes (memos) and Technical Reports represents a continuous program of research from 1948 on. The facility has been known by three names: Human Resources Research Laboratories, USAF; Human Factors Operations Research Laboratories, Air Research and Development Command; and Operational Applications Laboratory, Air Force Cambridge Research Center, Air Research and Development Command. R 250 (approx.)

3204

Fouriezios, N. T., Hutt, M. L. & Guetzkow, H. MEASUREMENT OF SELF-ORIENTED NEEDS IN DISCUSSION GROUPS. Contract N6ONR 232, Proj. NR 172 301, Task 7, Oct. 1950, 682-690. University of Michigan, Ann Arbor, Mich.

This paper accepts the importance of motivation as a factor in determining the nature of processes which go in a group situation and suggests a technique whereby one of these motivations--self-oriented needs--

may be measured in group discussion situations. The development of a rating-scale technique, a demonstration of its validity without clinical background information about the need-structure of the participants, and proof of its reliability are presented. Implications of the results of the research for leadership training are discussed. R 10

3205

Festinger, L., Back, K., Schachter, S., Kelley, H. H., et al. THEORY AND EXPERIMENT IN SOCIAL COMMUNICATION. Contract N6ONR 23212 NR 170 698, May 1950, 123pp. Institute for Social Research, University of Michigan, Ann Arbor, Mich.

This bulletin presents a number of laboratory reports together with a theoretical integration of work done to date on a program of research in the area of social communication. The studies have centered mainly on two sets of problems: communication stemming from pressures toward uniformity in groups, and communication in hierarchical structures. The six reports included are grouped under these two problems. T. G. I. R 46

3210

Cook, E. B. & Wherry, R. J. THE URINARY 17-KETOSTEROID OUTPUT OF NAVAL SUBMARINE ENLISTED CANDIDATES DURING TWO STRESSFUL SITUATIONS. Hum. Biol., May 1950, 22(2), 104-124. (Tufts Medical School, Boston, Mass. & Ohio State University, Columbus, Ohio).

As part of a larger investigation of a variety of measures in the selection of submarine personnel, the urinary 17-ketosteroid excretion of a group of naval enlisted submarine candidates during two stressful situations were studied. A psychological stress situation (taking a personality test and the Officers Classification Test) and a tank stress (routine training in the Submarine Escape Training Tank) were utilized; during the course of each situation, four urine samples were taken. Comparisons were made with basal samples. T. G. I. R 28

3218

Farnsworth, D. TRITANOMALOUS VISION AS A THRESHOLD FUNCTION. Proj. NM 002 014 09 06, XV(3), Rep. 274, July 1956, 12pp. USN Medical Research Lab., Naval Submarine Base, Conn. (Reprinted from: Die Farbe, 1955, (4), 185-196)

This is a critical survey of tritanomalous and tritanopic color vision. Tritanomalous color vision can be interpreted in terms of the ratio of the blue to the green plus red physiological tristimulus values. There are conditions for which this ratio appears to be constant for any fixed product of retinal area and illumination. The degree of tritanomalous vision is related to the absolute value of this product and to other constants of vision.

In particular, tritanomalous vision is not exclusively a foveal or small field phenomenon. Inherited and threshold tritanopia display the same symptoms; tritanopia and tritanomalous vision are different degrees of the same type of color deficiency. G. R. 23

3219

Rogers, O. E. ANALYSES OF BASIC TRAINING STAGE GRADES FOR MULTI-ENGINE AND SINGLE-ENGINE AVIATORS. Proj. NM 001 109 102, Rep. 3, Aug. 1956, 14pp. USN School of Aviation Medicine, Naval Air Station, Fla.

This report presents three analyses of basic training stage grades for a randomly selected sample of 199 officers who had completed advanced training for multi-engine and single-engine aviators. Factor analyses were made to determine whether the same or different factors account for variance in the two types of aviators. Other analyses were made to determine differences in grades between the two and differences in standard partial regression coefficients (beta weights) for predicting performance during advanced training. T.

3238

Steelman, R. J. A STATISTICAL ANALYSIS OF ELECTRONIC EQUIPMENT FAILURES IN EVALUATION. SR 06401 (NEI R1 1), Eval. Rep. 581, Feb. 1955, 18pp. USN Electronics Lab., San Diego, Calif.

Forty-two published reports of the Evaluation Branch, U. S. Navy Electronics Laboratory, were examined and the failures reported therein were analyzed statistically. The equipments covered a wide range of functions and included radar sets, radio receivers and transmitters, sonars, and other electronic equipments. The relative frequency of 28 common categories of failure was plotted as a bar graph. Descriptive statements of the type of failure for each category were given. Recommendations are made for the benefit of Bureau of Ships contractors. G. I.

3263

Bolt Beranek and Newman, Inc. CAPABILITIES AND LIMITATIONS INVESTIGATION OF LONG-RANGE PUBLIC ADDRESS EQUIPMENT FINAL REPORT PHASE I LITERATURE SEARCH AND PRELIMINARY THEORETICAL ANALYSIS. Contract DA 36 039 SC 64503, Proj. 132B & DA Proj. 3 99 12 022, Rep. 312, May 1955, 126pp. Bolt Beranek and Newman Inc., Cambridge, Mass.

The scope of Phase I of this work encompasses essentially a literature search and preliminary theoretical analyses of the important physical and psychological variables that affect the transmission of speech through the atmosphere on the one hand, and those that

affect the intelligibility of the received speech on the other. A brief discussion concerning the variability of experimental data is presented. The report concludes with an evaluation and analysis of the parameters to be investigated further in the light of the foregoing analysis. T. R 544

3421

Tufts University, Medford, Mass. ALERTNESS INDICATOR. INTERIM PROGRESS REPORT. Contract N5OR1 58, Task 2, Rep. 2, ca. 1947, 20pp. USN Special Devices Center, Port Washington, N.Y.

This report reviews the major issues and stages of development of the problems and instrumental refinements on the Alertness Indicator. Progress is reported on a systematic exploration of electronics-amplification techniques in recording brainwaves, muscle action potentials, eye-movements, and other physiological concomitants of changes in alertness. Some preliminary experimental results from several pilot studies are reported. T. G. R 13

3479

Voss, H. A. & Wickens, D. D. MEMORANDUM ON A COMPARISON OF FREE AND STADIAMETRIC ESTIMATION OF OPENING RANGE. Contract OEMSR 700, Proj. N 105, Memo. 29, OSRD Rep. 6114, Oct. 1945, 26pp. US Office of Scientific Research & Development, Washington, D.C. (University of Pennsylvania, Philadelphia, Penn.).

To compare ability of the 20 millimeter gunner to estimate opening range using the reticle of the Gun Sight Mark 14 with that of the range setter using unaided vision, 185 enlisted men were divided into two groups (gunners and range setters) and given training in range estimation on the firing line over a period of three days. They were then trained and tested in estimating the opening range of 1700 yards on both torpedo and medium altitude bombing runs. Differences in range estimations between the two groups were analyzed for the various conditions of the experiment. T. G.

3481

Birmingham, H. P., Householder, A. S., Kappauf, W. E. & Taylor, F. V. CHECK SIGHT SCORING METHODS. Contract OEMSR 815, Proj. N 111, Rep. 1, OSRD Rep. 4525, Jan. 1945, 12pp. US Office of Scientific Research & Development, Washington, D.C. (Brown University, Providence, R.I.)

An analysis is made of the reliability and accuracy of two procedures for check sight scoring in a situation where one man tracks in both train and elevation. Both procedures involve measuring the percent of time that the tracker keeps the target

within a defined scoring circle; one is a continuous scoring based on stop-clock scoring, the other is a sampling procedure based on spaced observations and a count. Comparative tests with four laboratory people acting as scorers and a larger scale test with 45 enlisted men as scores were made. An outline for a recommended check sight scoring procedure is given. T. G. R 2

3483

Deese, J., Lazarus, R. & Strange, J. STUDY OF THE EFFECTS OF STRESS UPON THE LEARNING AND PERFORMANCE OF PERCEPTUAL-MOTOR TASKS (21 09 004). Ca. 1955, 5pp. Johns Hopkins University, Baltimore, Md.

This paper describes the background, the experimental design, and the treatment of an investigation of the effects of stress upon the learning and performance of a psychomotor task in different individuals. Fifty trials on a simple perceptual-motor task (Rotary Pursuit Test with divided attention) were administered to 280 Air Force basic trainees under five different conditions of failure stress. The performance scores are to be studied in relation to findings from the Rorschach test as well as to learning.

3485

Sidorsky, R. C. & Newton, J. M. SHIP CONTROL V. THE EFFECTS OF MOTION AND NUMBER OF SURFACES ON DEPTH CONTROL WITH A CONTACT ANALOG DISPLAY. Contract NONR 2512(00), Proj. SUBIC, Electric Boat TR SPD 59 010, P59 012, Feb. 1959, 9pp. Electric Boat Div., General Dynamics Corporation, Groton, Conn.

To investigate two design characteristics (the use of one versus two surfaces and effect of displaying forward motion) of the Contact Analog (CA) display in submarines, five officers controlled a simulator which incorporated a CA display and a single joystick. They were required to make 200-foot depth changes under the four different display conditions. Three performance measures (depth error at 180 seconds, greatest depth error after 60 seconds, and time within plus or minus 30 feet of the ordered depth) were studied by variance analysis for effect of displays, motion, direction of depth change, range and subjects. T. I. R 7

3505

Silvestro, A. W., Kelly, J. B. & Courtney, D. HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF AIRPORT TRAFFIC CONTROL QUARTERS. FINAL REPORT. Contract FAA/BRD 89, Proj. P. Rep. 28, Aug. 1959, 85pp. Courtney and Company, Philadelphia, Penn.

This is the third and final report of a project devoted to bringing human factors

considerations to the design of airport traffic control quarters. The recommendations in all three reports represent a best approximation of the task requirements and needs of human controllers as both human beings and control specialists, and the applicable knowledge from prior human factors research. This report sets out in some detail certain elements of the over-all task: 1) console design, 2) the sit-stand chair, 3) panel layout, 4) floor covering, 5) acoustical treatment, 6) lighting, 7) color, 8) air conditioning, and 9) radiation safety and living facilities. Recommendations are supplemented with the necessary drawings. I. R 23

3525

Slade, I. M. PROTECTION AGAINST RADIANT HEAT. Paper SM/A/2/52, Jan. 1952, 6pp. The British Iron & Steel Research Association, London, England.

This paper discusses the problem of protecting steelworkers against intense radiant heat. Various types of protective clothing are reviewed and a preliminary investigation in the use of heat reflection from the outer surface of the clothing. Six samples of aluminum coated fabrics were tested for performance in reflecting heat rays and for the amount of heat transmitted. The most promising sample was further compared with asbestos and ordinary white overall material. A loose overall and apron were made from the experimental material and are undergoing tests in a steelworks. (See 4004) G. R 3

3595

Hollander, E. P. CONDITIONS AFFECTING THE MILITARY UTILIZATION OF PEER RATINGS: THE NEWPORT STUDY I. RELIABILITY. Contract NONR 760(06), Tech. Rep. 1 56, Jan. 1956, 21pp. Psychological Labs., Carnegie Institute of Technology, Pittsburgh, Penn.

To determine the reliability of peer ratings under various instructional sets and time exposures, 23 trainee sections at the Naval Officer Candidate School (OCS) in Newport were studied over a 16-week period. Four basic sociometric forms of the peer nomination variety were used. All sections were given a primary form calling for "success as a future Naval officer"; also, each section received one of three secondary forms--"leadership qualities," "interest and enthusiasm in Naval service," and "probability of success in OCS." Approximately half of the sections were given a "for research purposes" set, the other half "for administrative purposes." Peer ratings were made at the end of 3, 6, and 13 weeks. Both internal consistency of scores and relationship over time were analyzed. T. R 15

3606

Reich, E. THE THEORY OF INFORMATION. Proj. RAND, Res. Memo. 454, Sept. 1950, 47pp. Rand Corporation, Santa Monica, Calif.

This report discusses the modern theory of two-point unidirectional communication that is associated with the names of Shannon and Wiener in the light of Shannon's Theory of Information. While being in the most part an outline of Shannon's classical paper, the report also sketches some applications and presents a discussion of the question of uniqueness of formulation of the theory of information. The major divisions of the paper are: concepts of probability theory, definitions of information rates, properties of information rates, and prediction of time series. I. R 29

3619

Green, R. F., Zimiles, H. L. & Spragg, S. D. S. THE EFFECTS OF VARYING DEGREES OF KNOWLEDGE OF RESULTS ON KNOB SETTING PERFORMANCE. Contract N6ONR 241, SPECDEV CEN Proj. 20 M 1D, Task 6, Tech. Rep. SPECDEV CEN 241 6 20, Aug. 1955, 5pp. USN Special Devices Center, Port Washington, N. Y. (University of Rochester, Rochester, N. Y.).

To investigate the effect of giving different kinds, or degrees of specificity, of knowledge of results on accuracy of knob setting, three groups of 30 subjects each were given the task of bisecting an angular extent (blindfolded) by turning a knob through the entire extent of travel twice and then setting the knob at the midpoint of the angle. Three degrees of knowledge were used, one for each group: 1) no objective knowledge given by experimenter of previous trial result; 2) limited knowledge given in terms of "correct," "too far," or "not far enough"; and 3) exact knowledge given in terms of degrees of error. Mean settings (in terms of constant errors) and variability scores were analyzed for the effect of the three conditions. Implications for training are discussed. T. G.

3625

Hollander, E. P. CONDITIONS AFFECTING THE MILITARY UTILIZATION OF PEER RATINGS: THE NEWPORT STUDY II. VALIDITY AGAINST IN-TRAINING CRITERIA. Contract NONR 760(06), Navy Tech. Rep. 2 56, Feb. 1956, 28pp. Carnegie Institute of Technology, Pittsburgh, Penn.

From research completed with 23 trainee sections at the Naval Officer Training School in Newport, data are presented regarding the in-training validity of peer nominations as affected by three variables: 1) the period of time the group has spent together, 2) the nature of the set given (for research or for administrative purposes), and the quality or characteristic to be

evaluated. The criteria used were pass-fail, final academic average, and final military aptitude grade. The usefulness of early peer nominations was discussed in light of the findings. T. R 15

3640

Levine, M. TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY BETWEEN CONTROL AND DISPLAY. Contract AF 18(600) 50, RDO 694 44, WADC TR 53 236, Oct. 1953, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

To provide a description of the functional relationship between tracking performance and exponential delay between control and display, twelve subjects (in two experiments) performed a compensatory tracking task with different amounts of delay ranging from .015 to 2.700 seconds. A function relating time-on-target to amount of delay was generated. Implications of the results for equipment design are discussed. T. G. I. R 3

3650

Guedry, F. E., Jr. & Niven, J. I. INTERACTION OF VESTIBULAR STIMULI OF DIFFERENT MAGNITUDES AND OPPOSITE DIRECTIONS. PART I. PERCEPTION OF VISUAL APPARENT MOTION DURING ANGULAR ACCELERATIONS. Contract N7ONR 434, TO 1, ONR Proj. NR 143 455 & Bumedsurg. Proj. NM 001 063 01 36, Joint Proj. Rep. 36, Dec. 1954, 14pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To investigate the validity of the torsion pendulum analogy for semicircular canal function, three subjects were accelerated to a predetermined level and then braked to a stop to produce positive and negative accelerations in rapid succession. They reported on the direction and duration of apparent motion of a visual target (oculogyral illusion). The obtained data were fitted by theoretical equations which had been derived from the standard differential equation for a torsion pendulum. The correspondence between experimental and theoretical data was examined. G. R 4

3651

Bradley, J. V. DESIRABLE CONTROL-DISPLAY RELATIONSHIPS FOR MOVING-SCALE INSTRUMENTS. Proj. 7182 71514, WADC TR 54 423, Sept. 1954, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report summarizes a series of experiments designed 1) to investigate the effects of certain control-display relationships on making settings with moving-scale instruments, and 2) to attempt to find the optimum control to moving-scale display relationship. In each experiment several

display-control assemblies were used which required the subject to make settings on the moving-scale dial by a knob control which was located below or above the dial. In one case a moving-pointer was used. The relationships of control and display were varied as to direction of scale increase and knob turn, and direction of scale rotation in relation to knob turn. Errors in setting were recorded and analyzed. Recommendations are included. G. I. R 7

3656

Saul, E. V., Raben, Margaret W. & Jaffe, J. THE EFFECTS OF RIFLE RE-COIL ON MARKSMANSHIP PERFORMANCE: A REVIEW OF THE LITERATURE AND THE DESIGNATION OF RESEARCHABLE HYPOTHESES. Contract DA 19 020 ORD 3461, Proj. TB 1 1000, Proj. Rep. 1, May 1955, 16pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

This paper presents the results of a concise survey of the literature relating the effects of rifle recoil to shooter behavior. A series of problems, amenable to experimental investigation, are suggested. These problems pertain to: 1) motor performance characteristics of the shooter and 2) design characteristics of the weapon. T. R 21

3661

Scales, Edythe M. & Chapanis, A. THE EFFECT ON PERFORMANCE OF TILTING THE TOLL-OPERATOR'S KEYSET. J. appl. Psychol., Dec. 1954, 38(6), 452-456. (Bell Telephone Laboratories, Inc., Murray Hill, N. J. & Johns Hopkins University, Baltimore, Md.).

To investigate two measures of keying performance, accuracy and time, as a function of inclination of the keyset, 16 subjects were tested. The keyset was inclined at eight angles (0, 5, 10, 15, 20, 25, 30, and 40 degrees) relative to the horizontal working surface. Both practice and test sessions were included in the study, each extending over eight days. The subject's task was to key lists of ten-place number and letter combinations. Eight-by-eight Latin squares were used, the principle variables being subjects, days, and inclinations of the keyset. Time and error scores were analyzed for the effect of the variables with the results presented in a series of graphs. G. I. R 2

3674

Grant, D. A. & Kaestner, N. F. AUTOCORRELATION ANALYSIS OF GROSS LEARNING SCORES. Contract AF 33(038) 23294, Proj. 7708, Task 77141, AFPTC TR 54 94, Dec. 1954, 11pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.

This study applies autocorrelation methods to the analysis of gross learning scores on a rotary pursuit task. Twenty-four subjects were given 90 20-second trials and a learning curve obtained for performance averaged for each trial. The serial correlation function was computed for the averaged learning curve and fitted by an ellipse. The elliptic serial correlation function was compared with the theoretical autocorrelation obtained from the original exponential learning curve. Discrepancies were discussed. Individual serial correlations were obtained for 12 subjects, and a further group of 24 subjects was given five days of practice and the subsequent serial correlation functions studied. The usefulness of this method of analysis in the study of learning and motor skills is discussed. G. R 12

3783

Hill, P. R. & Kennedy, T. L. FLIGHT TESTS OF A MAN STANDING ON A PLATFORM SUPPORTED BY A TEETERING ROTOR. NACA Res. Memo. L54B12A, March 1954, 26pp. National Advisory Committee for Aeronautics, Washington, D. C. (Langley Aeronautical Lab., Langley Field, Va.).

Following the lead given by successful flight tests of a man standing on a jet-supported platform, flight tests were made of a man standing on a teetering-rotor-supported platform. The rotor was seven feet in diameter and driven by compressed-air jets at the tips supplied to the machine by air hoses. Hovering and limited translational flights were made both indoors and outdoors. The stability and controllability of the machine and flyer combination were evaluated. G. I. R 1

3820

Grings, W. W. HUMAN FACTORS RELATED TO THE DESIGN AND USE OF ELECTRONICS EQUIPMENT. FINAL REPORT. Contract NOBSR 57435, Aug. 1955, 28pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

This report contains four major sections: 1) The mission of the research contract - to investigate principles governing human interaction with electronic equipment in man-machine combinations, human engineering studies of the design and use of electronic equipment, and resultant recommendations for design and use of such equipment; 2) The procedures employed in conducting the research are described; 3) The work actually accomplished is summarized in the form of presentation of abstracts of projects completed; 4) A listing of formal reports and memoranda submitted under the contract is given.

R 49

3880

Biel, W.C., Brown, G.E., Jr. & Griffiths, W.J. STUDIES WITH THE VARIABLE DRIVE T-18, FOR 40 MM GUN CARRIAGE M2A1. Contract OEMSR 581, Proj. SOS 6, Rep. 13, & OSRD Rep. 5736, Sept. 1945, 22pp. Applied Psychology Panel, NDRC, Washington, D.C.

This report describes two experiments conducted in an attempt to evaluate the Variable Drive T-18 (a mechanical-hydraulic device, adaptable to the 40 millimeter Gun Carriage M2A1, providing means for varying the handwheel-gun traverse speed ratio in infinitely small steps by foot-operated control) as a tracking mechanism, when used as the azimuth drive. 1) The gun, equipped with the T-18, was compared to a standard gun for ease and accuracy of tracking short-range fast moving targets. The adaptability of the gun pointers in learning to use the drive was also studied. 2) A further study was made to determine whether the mechanical-hydraulic drive itself contributed to superior tracking performance. T. G.

3915

Pride, A.M. EVALUATION OF MARK 6B LIGHTED CHART BOARD. Proj. TED PTR AE 9118, TT34 96, R 52 1348 1, Nov. 1952, 8pp. USN Air Test Center, Naval Air Station, Md.

To evaluate the Mark 6B lighted chartboard in terms of suitability for day and night use in VA and VS type aircraft that perform or missions requiring accurate navigation, the chartboard was used by 12 pilots during day and night flights. The results of these trials are summarized with recommendations.

I. R 1

3930

Tonndorf, J., Brogan, F.A. & Washburn, D.D. AUDITORY DIFFERENCE LIMEN OF INTENSITY IN NORMAL-HEARING SUBJECTS. Rep. 55 31, Aug. 1955, 18pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

This paper is concerned with the validation of a method of regular modulation, used to obtain auditory difference limens of intensity, on normal hearing subjects. Several stimulus parameters were investigated: 1) ascending and descending mode of testing, 2) frequency and intensity of the carrier, 3) pattern and frequency of modulation. Averages and ranges of distribution were established. In addition, an attempt was made to correlate results from loudness-balance with those from difference limen measurements. T. G. I. R 17

3979

O'Neill, J.J. A COMPARATIVE STUDY OF INTELLIGIBILITY VALUES: FORMS A AND B. Contract N6ONR 22525,

Proj. NR 145 993 & Bumedsurg Proj. NM 001 104 500 47, Joint Proj. Rep. 47, April 1955, 24pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To investigate the relationship between similar intelligibility items when in write-down or multiple-choice tests in a free-room situation, two panels of 87 listeners each were presented words from Forms A and B of the multiple-choice intelligibility test. Presentation was either as multiple-choice items or write-down items. The subjects were tested, 13 to 15 at a time, in a classroom with acoustical treatment; the noise-level was 57 decibels. The values obtained for the two types of tests were compared statistically. The item values, as well as values obtained by three other investigators, are presented for use in future research. T. R 10

3985

Rohles, F.H., Jr. REMINISCENCE IN MOTOR LEARNING. Ph.D. Dissertation, June 1956, 85pp. University of Texas, Austin, Tex.

To determine simultaneously the effect of the type of pre-rest practice, initial level of mastery, and test-retest interval on reminiscence in motor learning, 270 subjects were tested. Under pre-rest practice conditions three inter-trial rests of 10, 35, and 60 seconds were used; pre-rest practice was discontinued when subjects reached either the 5, 25, or 40 percent mastery-level; and subjects were given either an immediate retest or were tested for recall after a delay of 30 or 60 minutes. Ten subjects were assigned randomly to each of the 27 experimental conditions and administered the SAM Rotary Pursuit Task. The data were analyzed by several methods for differences that could be attributed to the experimental conditions. T. G. R 76

4004

Slade, I.M. CLOTHING FOR PROTECTION AGAINST RADIANT HEAT. Research, May 1955, 8, 178-182. INF/4/55. (British Iron & Steel Research Association, London, England).

Clothing for protection against radiant heat, such as in a steelworks, is discussed (see also 3525). The method of heat reflection from the outer surface of the garment is detailed. Various materials have been coated with aluminum and tested for their protective values. The particular situations in which each type might be used are suggested along with the design of the clothing. A thermofoil reflecting headgear is illustrated. I. R 5

4023

Harvard University. PERIODIC STATUS REPORT XXVI, 16 MAY-15 NOVEMBER 1955. Contract N5ORI 76, Proj. NR142 201, PNM 65, Nov. 1955, 12pp.

Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.

For the period indicated, this status report presents 1) summaries of completed research, 2) a listing of special activities of the staff, 3) brief notes covering research in progress and 4) a check-list of reports issued by this laboratory under the present contract with the U. S. Navy, Office of Naval Research. R 177

4090

Atkinson, C. J. AN ESTIMATE OF THE SPECTRUM OF BODY-CONDUCTED SIDETONE FOR THE VOWEL (i). Contract DA 36 039 SC 63144, Suppl. Rep. 3, Sept. 1955, 32pp. State University of Iowa, Iowa City, Iowa.

This report presents the results of a series of studies designed to assess, to a first approximation, the spectrum and level of bone-conducted side tone. The method used was a test (for short exposures and for several frequencies and durations of a probe tone) of the threshold shifts produced by the voice (loud vocalization of the vowel [i]) and by random noise. The two kinds of threshold shifts were compared through the concept of critical bands. Tables and figures of threshold shifts as functions of time and of frequency are included for both kinds of stimuli. T. G. R 9

4098

Zeller, A. F., Harvey, E. S., Jr. & Burke, J. M. A STUDY OF UNDERSHOOT - OVERSHOOT NON-EMERGENCY ACCIDENTS, 1 JANUARY 1953 THROUGH 31 DECEMBER 1954. AFR 190 16, Aug. 1955, 49pp. USAF Directorate of Flight Safety Research, Norton AFB, Calif.

During the calendar years of 1953 and 1954, the United States Air Force experienced 313 accidents in which the pilot undershot, and 135 accidents in which the pilot overshot the runway when he had the option of a normal landing with an aircraft in mechanically adequate condition. An analysis of factors that might be contributing causes of the accidents was made and recommendations for corrective action were made. T. G.

4123

Deutsch, S. THREE SIMPLIFIED TESTS ON RELATIVE MOTION. NEL Rep. 527, June 1955, 10pp. USN Electronics Lab., San Diego, Calif.

This paper reports a study of the World War II Relative Movement Test (measure of ability to visualize relative motion from various forms of data) and an effort to adapt it for use by sonar operators. The original test was administered to a sample of 244 recruits, representative of the untrained Navy population. Test results were analyzed in terms of relative difficulty of

test, of test items, and causes of difficulty. Three versions were then developed which were considered suitable for use with enlisted men and were administered experimentally. Recommendations for further development are made. T. G. R 3

4124

Spector, P. A SURVEY OF THE AIRWAYS AND AIR COMMUNICATION SERVICE ELECTRONICS MAINTENANCE SYSTEM. Contract AF 30(602) 24, RADCN 55 388, June 1955, 22pp. American Institute for Research, Pittsburgh, Penn.

A field survey of the Airways and Air Communications Service maintenance system was made. Particular emphasis was placed on the new periodic maintenance procedures. A sample of 11 AACS squadrons were visited. Maintenance of radio, radar, and teletype equipment was observed, with maintenance procedures being examined as they took place in the normal daily activity. Data were collected from direct observation and from interviews with officers and airmen. The findings are presented with a brief analysis where appropriate and a recommendation for alleviating difficulties found.

4132

Gallup, H. F., Hambacher, W. O. & Dolby, J. R. HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: INVESTIGATIONS INTO THE OPTIMAL CHARACTERISTICS OF VISUAL WARNING AND CAUTION SYSTEMS. THE ATTENTION-GETTING VALUE OF A STEADY LIGHT AS A FUNCTION OF BRIGHTNESS, WITH RESPECT TO RAPIDITY AND RELIABILITY. TED NAM EL 52004, Part 9, NAMC ACEI 301, Oct. 1956, 15pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

To determine the brightness required of a steady light to make it as attention-getting as both alternating and flashing lights, one subject sat in a cockpit mockup, outside of which was mounted a tracking task. The task was to perform the tracking task and press a response key as rapidly as possible when a stimulus light appeared. Both night and day illumination conditions were tested using ten brightness levels (randomly presented) for each. The onset of the light occurred outside the subject's visual field and was automatically moved into the visual field after a delay of five seconds. Reaction times and no responses were analyzed and compared for the three types of stimuli used: steady, flashing, alternating. T. G. I. R 3

4164

Holmen, M. G., Katter, R. V., Jones, Ann M. & Richardson, I. F. AN ASSESSMENT PROGRAM FOR OCS APPLICANTS. HUMRRO TR 26, Feb. 1956, 50pp. Human

Resources Research Office, George Washington University, Washington, D.C.

To find out whether controlled rating situations used at the basic training center level could predict Officer Candidate School (OCS) success and failure well enough to be used as a screening device, records were obtained of the OCS disposition of 201 candidates who had been processed through experimental assessment programs prior to attending OCS. Since this assessment in no way influenced standard OCS selection procedures for these men, the relationship between their performance during assessment and subject disposition in OCS were analyzed. An objective description of candidates who pass and those who fail OCS was attempted. T. R. 16

4178

Burrows, A. A. & Jackson, K. F. PRELIMINARY DESCRIPTION OF AN ANOXIA-SENSITIVE PSYCHO-MOTOR TEST. FPRC 859, Dec. 1953, 11pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

A description is given of a new apparatus primarily designed to be sensitive to stress situations generally but applied in the first case to the stress of high altitude anoxia. T. G. I. R. 6

4187

Pepler, R. D. THE EFFECT OF CLIMATIC FACTORS ON THE PERFORMANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. 6. A TASK OF CONTINUOUS POINTER ALIGNMENT AT TWO LEVELS OF INCENTIVE. TRU 28/52, CES 406, RNP 54/795, Nov. 1953, 17pp. Climatic Efficiency Subcommittee, RNPRC, London, England. (Royal Naval Tropical Research Unit, University of Malaya, Singapore).

To determine whether the effects of warm climates on the performance of a task requiring skilled movements would be similar at two levels of incentive, 16 fit young men who had been living in the tropics were tested in four indoor climates. Under high incentive, the men received information on their performance and verbal encouragement, while under low incentive no information nor encouragement were offered. The dry and wet bulb temperatures of the four climates were 85/75, 90/80, 95/85, and 100/90 degrees F. The task was to keep a pointer aligned with a moving pointer; two speeds of the moving pointer were used. Error scores were analyzed for changes in performance due to the experimental variables. T. G. I. R. 11

4203

Pepler, R. D. THE EFFECT OF CLIMATIC FACTORS ON THE PERFORM-

ANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. A REPORT ON THE THIRD YEAR'S PSYCHOLOGICAL EXPERIMENTS AT SINGAPORE. APU 199/53, Jan. 1954, 8pp. Applied Psychology Research Unit, MRC, Cambridge, England. (Royal Naval Tropical Research Unit, University of Malaya, Singapore).

To investigate further the factors that had previously been found to affect performance in hot climates with particular reference to offsetting adverse climatic effects by changed incentive conditions, three experiments were conducted. Two of the experiments employed a complex mental task and one used a continuous pointer-alignment task. Two levels of incentive--knowledge of results and encouragement versus no information or encouragement--were used in two of the experiments, while speed stress was used in the third. The principle findings are reported. R. 15

4206

Lange, C. J., Rittenhouse, C. H. & Atkinson, R. C. FILMS AND GROUP DISCUSSIONS AS A MEANS OF TRAINING LEADERS. HUMPRO TR 27, March 1956, 41pp. Human Resources Research Office, George Washington University, Washington, D.C.

To increase the realism of leadership problems presented to students and to provide each student with maximum opportunity to participate in solving problems, a sound film-discussion technique was developed and evaluated experimentally: ten films depicting military officer problems were produced. The problems were based on descriptions of leadership problem situations collected from junior officers, non-commissioned officers, and data from Korea. Small group discussions followed a film-showing with one representative from each group then participating in a panel discussion. Three officer classes were trained by this technique and evaluated in several ways to study the effect on leadership training. T. R. 9

4213

Brozek, J. & Taylor, H. L. TESTS OF MOTOR FUNCTIONS IN LABORATORY INVESTIGATIONS ON FITNESS. Contract AF 33 (038) 21914, Proj. 21 32 004, Rep. 4, May 1954, 20pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Laboratory of Physiological Hygiene, University of Minnesota, Minneapolis, Minn.).

A battery of tests of motor functions was used in the study of human fitness and of changes in fitness under a variety of biological stresses (hard work, heat and lack of sleep under conditions of acute and semi-starvation). Employed were two tests of strength, three tests of speed, and one test of coordination. Examples are presented to show that the test battery, plus physiological

4217

indices of the ability to do hard physical work, measures deterioration in the presence of stress better than either approach alone and provides a more meaningful basis for analysis of fitness deterioration. T. G. I. R 62

4217

Bailey, M. EVALUATION OF NEW UNIVERSAL MILITARY LAST AND EXPERIMENTAL NAVY OXFORD. Proj. NT001 018, BUSANDA Symbol 3950 2, Aug. 1955, 15pp. USN Clothing Supply Office, Naval Supply Activities, Brooklyn, N. Y.

A shoe and last evaluation was conducted aboard the USS Antietam in order to determine the suitability of a new universal military last and the wear and fit characteristics of oxfords built over it. The evaluation was divided into three parts: 1) a service evaluation which indicated the fit and comfort of the new last and shoes, 2) a comparative evaluation of counters and insoles used in the standard Navy shoe and in the test shoe, and 3) a fitting evaluation which determined the effectiveness of a Brannock shoe fitting device adjusted to the sizing system of the new last. T. I.

4232

San Diego State College Foundation. APPLICATION OF THE FLESCH CRITERIA OF READABILITY AND HUMAN INTEREST TO HUMAN ENGINEERING DATA. Contract NONR 1268(01), April 1955, 12pp. San Diego State College Foundation, San Diego, Calif.

To evaluate the reading ease and interest level of two works on human engineering (Woodson, W. E., Human Engineering Guide for Equipment Designers, and Baker, C. A. and Grether, W. F., Visual Presentation of Information), the two formulas developed by Rudolph Flesch were applied to random samples of 100 words taken from each text. In addition, qualitative comparisons were made between the two works and between these two and other material on human engineering. Possibilities for improving readability and interest were proposed. T. R 8

4280

Gottsdanker, R. M. PREDICTION-SPAN, SPEED OF RESPONSE, SMOOTHNESS, AND ACCURACY IN TRACKING. Lab. Note SCRL 55 6, April 1955, 22pp. USA: Skill Components Research Lab., Lackland AFB, Tex.

To investigate the hypothesis that as tracking performance improves with practice, the balance between prediction-span and speed of response will change in accord with the smoothness of target motion, one group of subjects practiced on a course which had a smooth path of motion and few reversals of direction, while a second group

practiced a course with a reverse pattern. Periodic tests of prediction-span and speed of response were introduced. The autocorrelational measure of smoothness was obtained on a course which both groups tracked. Tracking errors, reaction time to error, and continuation distance were analyzed in terms of the predictions derived from the hypothesis. T. G. I. R 6

4286

Krullee, G. K. & Weisz, A. STUDIES IN THE VISUAL DISCRIMINATION OF MULTIPLE UNIT DISPLAYS. Contract N ONR 494(03), Proj. NR 145 088, Rep. 1954 494 03 23, Aug. 1954, 14pp. Tufts University, Medford, Mass.

Four experiments were conducted on the determination of distance thresholds for one-, two-, and three-digit displays as a function of the number of alternative possibilities in each position of the display. In the first experiment, eight categories were defined in terms of one-, two-, and three-digit codes using different choices of elemental symbols to define three such sets of codes. In the second, thresholds were obtained for several binary choices used both as one- and three-digit displays. In the final two experiments, an alphabet of 32 symbols was used to investigate the relation of threshold magnitude to amount of information with single-position displays. T. R 3

4292

USN Air Development Center. EFFECT OF REFLECTION PLOTTER ON SIGNAL DISCERNIBILITY ON AIRBORNE RADAR INDICATORS. TED Proj. ADC EL 8202, Rep. NADC EL 153 73 & Tech. Rep. SDC 166 1 119, May 1953, 7pp. USN Air Development Center, Johnsville, Penn.

To determine the effect on signal discernibility of the insertion of a reflection plotter between the cathode-ray tube of a radar and the operator, a series of tests was run using a plain cathode-ray tube and one equipped with a reflection plotter. Observers were required to call out the bearing of the target as soon as it was seen, on one or the other of the radars. Each observer was given six rotations of the sweep on each azimuth setting, and four azimuth settings for each signal level. The number of missed targets was plotted against target attenuation for the two situations. Recommendations are included. G. I. R 1

4481

Lichtenberg, P. TIME PERSPECTIVE AND THE INITIATION OF COOPERATION. Contract NONR 285(00), ca. 1951, 47pp. Research Center for Human Relations, New York University, New York, N. Y.

An analysis of previous uses of time perspective led to a statement relating time perspective to estimated probability of

success. An experiment in espionage was designed with three paths (choices of behavior) to a goal, one individual and two cooperative. By increasing the time needed to initiate cooperation, the probability of success for the cooperative paths was lowered; by manipulating the skills associated with the confederate, the time needed to carry out the activities to reach the goal was reduced, thus enhancing probability to success through cooperation. Also studied were modes of cooperation, influences of success and failure on estimates of future success, and confusion during the task. T. 1. R. 9

4503

Dunlap and Associates, Inc. HUMAN ENGINEERING EVALUATION OF THE FARRAND STAR TRACKER. Contract NORD 17719, Memo. Rep. 3, April 1957, 6pp. Dunlap and Associates, Inc. Stamford, Conn.

The Farrand Star Tracker has been evaluated from the human engineering viewpoint in order to identify human operator sources of error in the navigation system. Techniques are suggested for minimizing these errors through design changes in the 1) TV tube display, 2) tracking control, and 3) console design.

4511

Blank, A. A. & Quastler, H. NOTES ON THE ESTIMATION OF INFORMATION MEASURES. Contract DA 36 039 SC 56695, Proj. 8 103A, D/A Proj. 3 99 10 101, Rep. R 56, May 1954, 36pp. Control Systems Lab., University of Illinois, Urbana, Ill.

This collection of notes on the estimation of information measures is a by-product of psychological assessments of human performance in information processing. Since these experiments involve such large numbers, exact computations were replaced with approximating shortcuts based on samples of moderate size. T. G. R. 1

4543

Lockman, R. F. INVESTIGATIONS OF SOME ASSUMPTIONS BASIC TO PSYCHOLOGICAL TEST RESEARCH AND DEVELOPMENT WITH SELECTED NAVAL AVIATION CADETS: I. TESTS OF REGRESSION LINEARITY IN PREDICTING NAVAL AIR TRAINING CRITERIA FROM SELECTION MEASURES. II. COMPARISONS OF NON-NORMAL AND NORMALIZED PREDICTOR MEASURES. III. COMPARISONS OF WEIGHTED AND UNWEIGHTED PREDICTOR MEASURES. Proj. NM 001 108 100.06, Jan. 1955, 31pp. USN School of Aviation Medicine, Naval Air Station, Fla.

Three studies of naval aviation cadet selection measures and criteria of training success were conducted to test empirically

assumptions fundamental to the accurate utilization and interpretation of validity statistics. Using criteria of final over-all grades and of months-in-training in conjunction with two major selection measures, no upper selection limits were found. Using generalized distance and discrimination function techniques, no significant differences were found for five standard selection measures in non-normal and normalized combined forms. Differential weighting of these five measures was found useful for discriminating pass from attrition groups. T. G. R. 17

4553

Morsh, J. E., Wilder, Eleanor W. IDENTIFYING THE EFFECTIVE INSTRUCTOR: A REVIEW OF THE QUANTITATIVE STUDIES, 1900-1952. Proj. 7714, Task 77243, AFPTRC TR 54 44, Oct. 1954, 151pp. USAF Training Aids Research Lab., Chanute AFB, Ill.

A comprehensive and critical review of pertinent research in the selection and training of instructors is presented. The material is organized under two large topic headings: criteria of instructor effectiveness (ratings, objective observation, and student change), and the predictors--traits and qualities assumed to be related to instructor effectiveness (intelligence, education, scholarship, age and experience, knowledge of subject matter, personality, etc.). The findings are presented tabularly, and from the arrays of results, the reviewers have set down what appeared to them to be the most probable generalizations and discuss the implications for future research. R. 392.

4555

Torrance, E. P. SOME CONSEQUENCES OF POWER DIFFERENCES ON DECISIONS IN B-26 CREWS. Proj. 7713, Task 57157, AFPTRC TR 54 128, Dec. 1954, 29pp. USAF Crew Research Lab., Randolph AFB, Tex.

To study some of the consequences of power differences on decision-making in permanent groups with well-defined power structures and to compare these effects with those obtained in similarly constituted temporary groups, B-26 combat crews were used. Each of 62 intact crews and 32 rearranged crews were administered four decision-making problems of varying nature and difficulty: horse-trading problem, dot test, conference-group projection sketch, and a survival problem. Both individual and group decisions were elicited. Analysis was in terms of the "influence" and "failure to influence" of each group member. T. G. R. 17

4556

Lichtenberg, P. & Deutsch, M. A DESCRIPTIVE REVIEW OF RESEARCH ON THE STAFF PROCESS OF DECISION-MAKING.

Contract AF 18(600) 404, Proj. 505 036 0004, AFPTRC TR 54 129, Dec. 1954, 50pp. USAF Crew Research Lab., Randolph AFB, Tex.

This report presents a digest of research materials that might have pertinence to the central problems of the staff process of decision-making. It is organized under six topic headings: group vs. individual effort, size of group, leadership, coordination as a problem, motivation, and gaps in the literature. The digest emphasizes primarily the experimental social-psychological literature, although there are some items of a more general sociological and social anthropological nature. R 165

4557

McPherson, J. H. PREDICTING THE ACCURACY OF ORAL REPORTING IN GROUP SITUATIONS. Contract AF 18(600) 5, Proj. 505 040 0004, AFPTRC TR 54 130, Dec. 1954, 84pp. USAF Officer Education Research Lab., Maxwell AFB, Ala.

This bulletin describes a study of the accuracy of reporting on assigned materials in a course at the Air University. A Reading Distortion Test and a Reactions to Group Situations Test were used to predict which men would be most likely to distort the content of assignments in making oral reports to groups. The tests were given to 100 men. Eight men predicted to be high in distortion and eight predicted to be low on the basis of these tests were then observed as they discussed specially prepared readings in class. Different patterns of behavior tending to bear out the predictions are discussed. T. I. R 41

4557

Fleishman, E. A. EVALUATIONS OF PSYCHOMOTOR TESTS FOR PILOT SELECTION: THE DIRECTION CONTROL AND COMPENSATORY BALANCE TESTS. Proj. 1701, AFPTRC TR 54 131, Dec. 1954, 28pp. USAF Skill Components Research Lab., Langland AFB, Tex.

As part of a continuing effort to develop new apparatus tests that might measure more efficiently the psychomotor skills important to pilot success, two promising tests (Direction of Control, and Compensatory Balance) were administered to over 1200 unclassified pilot cadets along with the complete Aircrew Classification Battery. Reliabilities, distribution statistics, internal consistencies, validities (pass-fail criterion data for primary stage of flying training) and correlations with other Air Force classification tests were computed. The contribution to be expected from the tests if added to the Battery was studied. Complete test descriptions, wiring diagrams, instructions, and stanine tables are given. T. G. I. R 7

4563

Weislogel, R. L., Schwarz, P. A., Folley, Joanne P. & Flanagan, J. C. DEVELOPMENT OF EXPERIMENTAL TESTS FOR COMBAT ARMS CLASSIFICATION. Contract DA 49 083 OSA 761 B 6 250 70, Proj. 29560000, PRB Tech. Res. Note 45, May 1955, 99pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D. C. (American Institute for Research, Pittsburgh, Penn.).

As part of a long-range research effort to develop procedures for identifying men who will perform effectively in combat arms, an effort was made to develop combat classification tests of personal characteristics and perceptual skills. After preliminary tryouts, six tests were developed: interest in military activities and participation in sports and hobbies, identifying weapon sounds, following verbal instructions, identifying pictures of military objects, selecting pictures from verbal instructions, and orienting parts of a scene in a photograph of an entire scene. The tests were given to 678 infantrymen. Test scores were compared with criterion ratings by associates and superiors of probable combat success and with performance on a tactical field problem. T. I. R 46

4564

McIntyre, C. J. & McCoy, E. P. THE APPLICATION OF SOUND MOTION PICTURES FOR RECORDING BILLET ANALYSIS INFORMATION. Contract N6ONR 269, SPECDEVGEN Proj. 20 E 4B, Task VII, Tech. Rep. SPECDEVGEN 269 7 41, March 1954, 15pp. USN Special Devices Center, Port Washington, N. Y. (Pennsylvania State University, State College, Penn.).

The application of sound motion pictures to recording and communicating billet analysis information was studied systematically. Four basic problems were explored: 1) Can films be made which will supply needed job information to present and potential users of such information? 2) What form should such films have? 3) What feasible procedures can be developed to produce such films? 4) What feasible procedures can be developed to use such films? Answers to these questions have been treated in summary form in this paper. I.

4573

Beck, L. H., Kruger, L. & Calabresi, P. OBSERVATIONS ON OLFACTORY INTENSITY. I. TRAINING PROCEDURE, METHODS, AND DATA FOR TWO ALIPHATIC HOMOLOGOUS SERIES. Ann. N. Y. Acad. Sci., March 1954, 58(2), 225-238. (Yale University, New Haven, Conn.).

To investigate the problem of measuring odorous intensity, a standard odorant (heptanal)

was selected and a set of diluted solutions of the standard prepared that yielded a scale of odorous intensity physically anchored in terms of the concentrations of the standard. The subjects' task was to find a concentration of the standard that was as strong as a comparison odor differing in quality. The training procedures, experimental methods and data for two aliphatic homologous series for four subjects are presented.

T. G. R 10

4576

Grandpierre, C. & Biget, C. THE PHYSIOLOGICAL BASIS OF PROTECTION AFFORDED BY CLOTHING. (LES BASES PHYSIOLOGIQUES DE LA PROTECTION VESTIMENTAIRE). Trans. 563, April 1956, 13pp. Royal Aircraft Establishment, Farnborough, Hants, England.

During recent years, considerable progress has been made on the determination of the protective capacity of clothing by placing the problem in the field of physiological experimentation. Methods of measuring the thermal insulating capacity of clothing are described: 1) measurement expressed in "clos," 2) measurement expressed in "tolerance time," and 3) a mixed method. T.

4607

Highland, R. W. A GUIDE FOR USE IN PERFORMANCE TESTING IN AIR FORCE TECHNICAL SCHOOLS. Proj. 7709, Task 77162, ASPRI TM 55 1, Jan. 1955, 71pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.

This performance testing guide is intended to supplement the information on performance testing currently contained in Air Training Command Regulation 50-2, "Student Grading," and ATRC Manual 50-900-9, "Improvement of Grading Practices for Air Training Command Schools." Following the introduction which defines performance testing and the need for such testing, various chapters deal with 1) characteristics of performance tests, 2) development and administration, and 3) utilization of test results. A checklist for use in developing a performance test and a procedure for measuring test reliability are appended. T. G. I.

4640

Long, G. E. THE EFFECT OF DURATION OF ONSET AND CESSATION OF LIGHT FLASH ON THE INTENSITY-TIME RELATION IN THE PERIPHERAL RETINA. J. opt. Soc. Amer., Nov. 1951, 41(11), 743-747. (Columbia University, New York, N. Y.).

To investigate how the variation in the wave form of the light flash, as manifested by the rate of onset and cessation of the

stimulus, influences the threshold in the periphery, two experiments are reported. The first studies the intensity-duration function for peripheral threshold stimulation over a range of durations from 0.02 to 0.24 seconds. The flashes were rapid in onset and cessation (nearly rectangular in wave form). The second determines the total energy required for threshold excitation for flashes of various wave forms (different onset and cessation times), the maximum duration always being below the critical duration obtained in the first experiment. G. R 11

4647

Ratoosh, P. & Graham, C. H. AREAL EFFECTS IN FOVEAL BRIGHTNESS DISCRIMINATION. J. exp. Psychol., Dec. 1951, 42(6), 367-375. (Ohio State University, Columbus, Ohio & Columbia University, New York, N. Y.).

To investigate the effect on foveal brightness discrimination of changes in the size of both the test and the adapting-fields, a foveal, circular, illuminated adapting-field was presented to one eye of the subject to which was added a concentric, circular test-field, smaller than, or equal in size to the adapting-field. The diameter of the fields was varied from 0.17 to 1.34 degrees of visual angle. The test-field was presented for a duration of 0.02 seconds and over a wide range of illuminations. Data from two subjects were analyzed for constant sizes of both fields, for constant test-field size with increasing adapting-field size, and for a constant adapting-field size with increasing test-field size. T. G. I. R 16

4658

Guilford, J. P., Kettner, N. W. & Christensen, P. R. STUDIES OF APTITUDES OF HIGH-LEVEL PERSONNEL. THE RELATION OF CERTAIN THINKING FACTORS TO TRAINING CRITERIA IN THE U. S. COAST GUARD ACADEMY. Contract N6ONR 23810, Rep. 13, May 1955, 19pp. University of Southern California, Los Angeles, Calif.

The purpose of this investigation was three-fold: 1) to attempt to verify thinking factors found in previous studies, 2) to gain further information about new tests, and 3) to relate certain experimental tests to training criteria furnished by the United States Coast Guard Academy. Scores on 20 experimental tests, nine Academy tests, and 11 criteria (ten grades earned in courses and an adaptability measure based on ratings of cadets while on cruise) were studied by factor analytic methods. Factors extracted were identified and discussed in relation to criterion scores. The adequacy of the present Academy tests for prediction purposes was discussed. T. R 15

4659

4659

Guilford, J. P., Berger, R. M. & Christensen, P. R. STUDIES OF APTITUDES OF HIGH-LEVEL PERSONNEL. A FACTOR-ANALYTIC STUDY OF PLANNING II. ADMINISTRATION OF TESTS AND ANALYSIS OF RESULTS. Contract N6ONR 23810, Proj. 150 044, Rep. 12, May 1955, 23pp. University of Southern California, Los Angeles, Calif.

To isolate and define the primary abilities involved in planning performances, a battery of tests covering six hypotheses and a number of reference factors was administered to 364 entering United States Air Force aircrew trainees. One test representing an actual planning activity of a certain type was included in the battery. The scores were intercorrelated and 17 factors were extracted. Each factor that could be identified was described and interpreted. Some of the factors had been previously reported and four factors unique to planning tests were found. T. R 21

4702

Smith, W. R. & Dudek, F. J. REPORT ON PRELIMINARY STUDY OF HAND GRIPS USED WHEN FIRING THE PISTOL. Res. Note 1, June 1952, 11pp. USA Human Research Unit No. 2, Ft. Ord, Calif.

To compare the one-handed grip and the two-handed grip when used to fire the .45 calibre pistol, two groups of 84 men were selected randomly from a company of basic trainees. One group used the one-handed grip for firing ten rounds of slow-fire and 15 rounds of quick-fire, the other group used the two-handed grip. Variables such as target and range position differences were controlled systematically. Records were obtained of the number of hits scored by each man. The scores for the two groups were compared. T. G.

4739

Beverly, R. F. A MEASURE OF RADAR SCOPE INTERPRETATION ABILITY RSI TEST #1. Proj. 506 006 0002, Res. Note AO: 52 9, Dec. 1952, 19pp. USAF Human Resources Research Center, Lackland AFB, Tex.

This report is concerned with the development and description of a test of navigational radar scope interpretation ability. The interpretation task was defined as an activity requiring a complex of abilities and knowledges that may be measured by performance of tasks requiring map-scope correlation. A photograph-flight chart test was constructed requiring such performance. The test was given to four classes of rated pilots and the scores were analyzed for reliability. Some evidence for validity of the test is also presented. The problem of validation is discussed in some detail. T. I. R 1

4745

University of Oklahoma Research Institute, Norman, Okla. DISASTERS AT SEA. Tech. Memo. ORO T 204, Aug. 1952, 20pp. Operations Research Office, Johns Hopkins University, Baltimore, Md.

This is one of a series of disaster studies made to determine the existence or development of emergency behavior patterns. Records of outstanding sea disasters were studied and descriptions of relevant individual and group behavior were extracted. Conclusions about the factors that determine whether or not panic will occur (leadership, training, morale) and how control of crew and passengers can be maintained are stated. R 37

4754

Logan, L., Killian, L. M. & Marrs, W. A STUDY OF THE EFFECT OF CATASTROPHE ON SOCIAL DISORGANIZATION. Tech. Memo. ORO T 194, Dec. 1950, 138pp. Operations Research Office, Johns Hopkins University, Baltimore, Md. (University of Oklahoma Research Institute, Norman, Okla.).

This is the first in a series of studies in which, in the absence of actual combat experience, the reactions of troops to atomic attack are extrapolated from the observed behavior of civilian groups in disasters. The bases for this study are the April 1947 Texas City explosion, four towns hit by tornadoes, and a holocaust fire. Attention is given to 1) the reactions of the participants, 2) the functioning of already existing disaster control organizations, and 3) the problems of individual and group rehabilitation. Conclusions are given regarding the pattern of social reorganization, the effect of previous organization and training, and the best methods of controlling panic. I. R 11

4755

US Panel on Personnel Committee on Human Resources. SYMPOSIUM ON TECHNICAL PROBLEMS IN THE EFFICIENT CLASSIFICATION AND ALLOCATION OF MILITARY PERSONNEL. HPT 202/1, Oct. 1952, 63pp. US Panel on Personnel Committee on Human Resources, Dept. of Defense, Washington, D. C.

The papers presented in this symposium deal with technical problems in the classification and allocation of personnel. Completed research as well as research under way are reviewed and discussed. Included are reviews of: 1) the results of the Armed Services personnel procurement and induction procedures, 2) physical standards, 3) the Navy's research in establishing minimum psychological requirements for jobs and the technical problems involved, and 4) application of intra-service classification procedures of classification and allocation. A summary of the symposium is included. T. G. I. R 6

4762

Zuckerman, J. V. TESTING WITH A PRE-RELEASE FILMSTRIP AS A MEANS OF PREDICTING FACTUAL LEARNING FROM A TRAINING FILM. TECHNICAL MEMORANDUM REPORT. HRRL Memo Rep. 14, Nov. 1951, 8pp. USAF Human Resources Research Labs., Bolling AFB, Washington, D. C.

An attempt was made to use experimental methods to assess the extent to which a filmstrip made from a story-based art work can serve as a predictive device to secure data on how much people would learn from a completed factual figure. Such a filmstrip was made for preliminary testing of an Air Force training film. The filmstrip or the finished film were administered to groups of student pilots. Both groups were tested before and after administration with an identical factual test. Test results were analyzed after scores, absolute gain and relative gain in learning. T.

4765

Stobie, W. H., Abbott, P. S. & McClelland, W. A. THE DEVELOPMENT AND ANALYSIS OF A SECOND TEST OF RADAR SCOPE INTERPRETATION ABILITY. RSI TEST #2. Proj. 506 006 0002, Res. Note 52 10, Dec. 1952, 9pp. USAF Human Resources Research Center, Lackland AFB, Tex.

A test of radar scope interpretation was constructed using 0-15 scope photographs and a standard flight chart. The subject's task was to identify two specified returns on each of 16 photographs in a two-hour period. The test was administered to 161 aircraft observer students, most of whom were also rated pilots. Test results were subjected to an item analysis, estimates of test reliability and of test validity. This latter item was not fully reported in this note. T. 1. R 3

4769

Pride, A. M. INSTALLATION AND TEST OF AUTOMATIC LIGHT INTENSITY CONTROL SYSTEM FOR APPROACH AND RUNWAY LIGHTS. Proj. PTR AE 2201, ET311 292, Bull. 30, Rep. 1, Dec. 1952, 12pp. USN Air Test Center, Naval Air Station, Md.

An automatic brightness control system developed by the National Bureau of Standards was evaluated in connection with runway approach lights at the Naval Air Station, Patuxent River. The system, responsive to horizontal visibility, has functioned satisfactorily and provides good control at proper brilliance. Recommendation is made to examine the improvement to be obtained by the addition of vertical transmissivity information to the system through the use of a ceilometer. 1. R 4

4772

Chapman, D. W., Jr. (Chm.). SYMPOSIUM ON RESEARCH IN GROUP BEHAVIOR. HML 200/1, 4-5 Feb. 1952, 106pp. US Panel on Human Relations and Morale of the Committee on Human Resources, Dept. of Defense, Washington, D. C.

This document contains a compilation of papers presented at the symposium on Research in Group Behavior. The topics discussed indicate the range of problems that affect the Armed Forces, some of the types of research methods under study, and the kinds of efforts being made to solve group behavior problems. T. G. 1. R 16

4810

Rosa, J. J. SECURING AND RETAINING VOLUNTEERS FOR THE GROUND OBSERVER CORPS. Proj. 7731, Task 77428, AFPTRC TN 55.7, June 1955, 47pp. USAF Crew Research Lab., Randolph AFB, Tex.

A survey of literature was made to uncover factors related to volunteer service in the Ground Observer Corps (GOC). Studies of the personal and social characteristics of volunteers and of efficient methods and techniques for motivating and retaining civilian volunteers were reviewed and interpreted in terms of GOC problems. R 183

4813

Johnson, C. D., Burke, L. K., Loeffler, June C. & Drucker, A. J. PREDICTION OF THE COMBAT PROFICIENCY OF INFANTRYMEN. Proj. 29560000 & PRB Proj. B 8 251 20, PRB Tech. Res. Rep. 1093, July 1955, 16pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D. C.

Research completed and research plans pertinent to the development of aptitude areas for classifying personnel into the Combat Arms are reviewed. A self-description blank, a personal inventory of combat-related traits, and several tests of learning and perceptual abilities were tried out on two combat regiments in Korea. Among the results of this series was a new and promising self-description blank predicting combat performance. Reanalysis of available data indicated that an interest-questionnaire developed in a fighter factor study is equally promising. These items are being further investigated for development of the desired aptitude areas. T. G. 1. R 4

4817

USN School of Aviation Medicine. RESEARCH NOTES FROM THE AVIATION PSYCHOLOGY LABORATORY. 1955, 57pp. USN School of Aviation Medicine, Naval Air Station, Fla.

This report presents 13 short papers containing pertinent research results not previously published. The subject areas represented are: statistical methods, various

experimental methods or procedures, sensory tests, personality trait tests, predictive factors for flight training, authoritarianism and related factors, and others. T. G. R 40

4820

Siegel, A. I., Jensen, J. J. & Danzig, E. R. AN INVESTIGATION AND TEST OF THE TROUBLE-SHOOTING ABILITY OF AVIATION ELECTRICIANS. Contract NONR 1348(00), Series 1955, Inst. Rep. 1, Jan. 1955, 80pp. Institute for Research in Human Relations, Philadelphia, Penn.

A battery of four separate performance tests (AE Trouble-Shooting Performance Examination) was developed. Each test measures the aviation electrician's ability in one of the four critical skills judged necessary for adequate trouble-shooting. The tests were administered to a fleet sample of aviation electricians and the scores analyzed for evidences of test reliability and test validity. Four written tests, each related by content to an individual "B" school phase, were first developed on the basis of internal consistency and then validated against the AE Trouble-Shooting Performance Examination. A short form of the written test was also developed. Some additional relationships were studied. T. I.

4837

Sirion, G. B. EVALUATION AND COMBINATION OF CRITERION MEASURES BY FACTOR ANALYSIS: A STUDY OF B-25 PREFLIGHTS BY AIRPLANE AND ENGINE MECHANICS. Proj. 507 012 0003, AFPTRC TR 54 23, May 1954, 80pp. USAF Training Aids Research Lab., Chanhute AFB, Ill.

This study attempts to develop criterion measures of job proficiency by observing behaviors of the criterion series and to attack the problem of evaluating these and other criterion measures by principal components. The basic set of criterion measures came from study and systematic observation of the behaviors of 335 Air Force mechanics preflight of the B-25. Criterion measures collected were 1) supervisor rankings, 2) troubles in flight after preflight, 3) hours flown up to a six-month period, 4) proficiency test scores, and 5) observation of behavior check list scores. Additional information obtained consisted of personal and control items. T. R 36

4860

Dunlap and Associates, Inc. VISUAL STAR TRACKING THROUGH A PERISCOPE. Contract NONR 17719, Memo Rep. 9, July 1957, 11pp. Dunlap and Associates, Inc., Stamford, Conn.

The problem examined in this memorandum is the determination of those values of physical parameters in a periscope system in vibratory motion which will permit and facilitate the detection, acquisition, and

tracking of a star by human observer. The various sections deal with 1) the basic ability of the human observer to detect a point source of light against a background, 2) the facilitation of this ability by addition of magnification, 3) the relation degradation of performance when relative vibratory motion is introduced between observer and star, 4) special problems such as field of view, optical quality, etc., and 5) periscope parameter values for facilitating performance. G. I.

4905

Coakley, J. D., Abbott, W. C. & Bishop, E. W. HUMAN ENGINEERING REVIEW OF REQUIREMENTS FOR THE RADIO SET AN/GRC-53 () ANTENNA AND MAST PART II: THE MAST ASSEMBLY. Contract DA 36 039 SC 64647, DA Proj. 3 99 01 022 & SC Proj. 2004A, Sept. 1957, 21pp. Dunlap and Associates, Inc., Stamford, Conn.

This study reviews the requirements for an antenna mast to be used with Radio Set AN/GRC-53 from a human engineering viewpoint and makes recommendations for design that will facilitate operator use of the mast. The study specifically reduces the time and manpower required to assemble the radio set in field operations. T.

4912

Zigler, M. J. PRESSURE ADAPTATION-TIME: A FUNCTION OF INTENSITY AND EXTENSITY. Amer. J. Psychol., Oct. 1932, XLIV, 709-720. (Wellesley College, Wellesley, Mass.).

To determine whether adaptation-time to continued cutaneous stimulation varies with the intensity and extensity of stimulation and whether adaptation-times for continued stimulation and for the reestablishment of normal equilibrium afterward are essentially of the same magnitude or different, two experiments were conducted. In the first, two sets of stimuli were used, one varying only in weight, the other only in diameter. The times between application of the stimulus and the time it was no longer felt were recorded and analyzed. The second experiment measured the time lapse between stimulus removal and the disappearance of all after-effects. T. R 13

4946

Roff, M. F. PERSONNEL SELECTION AND CLASSIFICATION PROCEDURES: SPATIAL TESTS A FACTORIAL ANALYSIS. FINAL REPORT. Proj. 21 29 002, Jan. 1951, 47pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Institute of Child Welfare, University of Minnesota, Minneapolis, Minn.).

The factor analysis of a 65-variable aptitude test battery (primarily concentrated in the space thinking area) given to a large

population of candidates for aircrew training is reported. The number of basic abilities required by the battery are described and interpreted. The relationship of these factors to earlier research findings and to each other are discussed. T.

4947

Roff, M. THE PILOT CANDIDATE SELECTION RESEARCH PROGRAM V. A FACTORIAL STUDY OF THE MOTOR APTITUDES AREA. Contract AF 41(128) 160, Proj. 21 29 008, Rep. 5, March 1953, 25pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Institute of Child Welfare, University of Minnesota, Minneapolis, Minn.).

The factor analysis of a 69-variable aptitude test battery given to 2,000 Naval Aviation Cadets prior to pilot training is reported. Following a set of five subanalyses of groups of tests selected from the total battery, a total analysis with 63 variables is made. Fourteen factors were extracted and interpreted. Comparisons are made with results from previous Air Force populations. The major contribution is the splitting of the psychomotor area into several factors previously undiscovered. T. R 5

4957

Ogle, K.N. ON STEREOSCOPIC DEPTH PERCEPTION. J. exp. Psychol., Oct. 1954, 48(4), 225-233. (George Washington University, Washington, D.C.).

The relationship between retinal image disparity and stereoscopic depth perception was reinvestigated under the controlled conditions possible with modern instrumentation. The subject was presented a binocular view of a fixation point and central portions of both the reference and test objects (thin steel rods). By an arrangement of baffles, one eye saw the upper portion while the other saw the lower portion of the test line. When there was a vertical gap, both eyes could see the center portion. The task was to adjust the test line as the gap width was changed so that it was in the same plane as the reference line. A falling sphere was substituted for the test rod in some of the experiments. G. I. R 5

4969

Tinker, M.A. CRITERIA FOR DETERMINING THE READABILITY OF TYPE FACES. J. educ. Psychol., Oct. 1944, 385-396. (University of Minnesota, Minneapolis, Minn.).

To compare visibility, perceptibility at a distance, and speed of reading of materials printed in ten type faces, 36 subjects were tested. The ten type faces were all printed in ten-point type; 30 five-letter words were cut from the text for each type face and mounted on a four-by-six inch card. Visibility

measurements were made with the Luckiesh-Moss Visibility Meter, perceptibility at a distance by means of an optical bench, and speed of reading by means of standardized reading tests. Conclusions are drawn as to the most valid method to use as a measure of readability. T. R 9

4987

Tresselt, M.E. & Leeds, D.S. THE EINSTELLUNG EFFECT IN IMMEDIATE AND DELAYED PROBLEM-SOLVING. J. gen. Psychol., 1953, 49, 87-95. (New York University, New York, N.Y. & University of Illinois, Urbana, Ill.).

Two problems in mental set (Einstellung) and problem solving were investigated: the relationship between the Einstellung problems given and the Einstellung effect, and the retention of the effect after one, two, and seven days. In the first experiment, seven groups of subjects (ten in each group) were given 2, 4, 6, 8, 10, 12, or 14 Einstellung problems respectively which could be solved by a given formula and two critical problems which could be solved with the formula or by a simple subtraction or addition. In the second experiment, three groups were given practice problems on one day and the critical problems one, two, or seven days later. T. G. R 11

4992

O'Brien, F.E. MOTIVATION OF RESEARCH AND DEVELOPMENT ENGINEERS. A RESEARCH REPORT. 1956, 40pp. University of Chicago, Chicago, Ill.

The problem of motivating the engineer is examined first in terms of the human relations problem basic to any system of motivation of human beings. More specific problems relating to government needs for engineers, work-place adjustment, and factors arising from the complexity of modern society and the resultant attitudes toward the engineering profession are discussed. Prestige and status aspects of the profession are analyzed in both an industry and the community. Finally, the role of leadership is discussed as it affects the morale of individuals. R 13

4995

Underwood, B.J. AN ORIENTATION FOR RESEARCH ON THINKING. Psychol. Rev., May 1952, 59(3), 209-220. (Northwestern University, Evanston, Ill.).

A point of view concerning thinking is developed for the sole purpose of giving direction to research on certain variables which appear to influence efficiency in thinking. The one essential assumption presented is that for new relationships to be acquired, the pertinent responses to stimuli must be contiguous. Predictions concerning the influence of certain manipulable variables

(perceptual vs. symbolic presentation of stimuli, number of stimuli, similarity among stimuli, biases) on thinking are made. Some problems are discussed which are not considered in the present orientation. R 30

Adamson, R. E. FUNCTIONAL FIXEDNESS AS RELATED TO PROBLEM SOLVING: A REPETITION OF THREE EXPERIMENTS. *J. exp. Psychol.*, Oct. 1952, 44(4), 288-291. (Stanford University, Stanford, Calif.).

To repeat demonstrations of the hypothesis that problem solving may in some instances be delayed through the "functional fixedness" of solution objects using more subjects and better controlled conditions than previous experiments, three experiments were conducted with 57 subjects (29 experimental group, 28 control group). Both groups were given the "box", "gimlet", and "paper-clip" problems in that order. Experimental subjects were given each problem after having first used the solution objects in a function dissimilar to that demanded for solution. Control subjects were given the problem without pre-utilization. Number of solutions and time-to-solution were analyzed for differences between the two conditions. T. R 3

Bakan, P. PRELIMINARY TESTS OF VIGILANCE FOR VERBAL MATERIALS. Contract AF 33(038) 25726, Proj. 507 011 0001, Res. Note 52 7, July 1952, 7pp. USAF Human Resources Research Center, Lackland AFB, Tex.

To determine whether a testing situation using verbal materials is practical in a study of vigilance, a series of digits were recorded on a tape at the rate of one per second for 90 minutes. In the series, sequences of odd numbers were restricted and sequences of exactly three odd numbers occurred every 36 times; six of such sequences occurred in each 15-minute period. The subject's task was to listen to the tape and write down each three-odd-number sequence heard. Eight subjects performed for 90 minutes on four different days. Error scores were analyzed for effect of period and of days. Suggestions for further study are made. T. G. R 1

Brand, H. VARIABILITY IN PERCEPTUAL DIMENSIONS. *J. Pers.*, March 1954, 22(3), 395-416. (University of Connecticut, Storrs, Conn.).

To investigate the differential variability of four dimensions of perception--discrimination, apprehension, comprehension, and interpretation--23 subjects were studied. Three sources of variability were used: 1) trials or test periods, 2) different stimulus objects (Rorschach Cards I, IV, and VII), and 3) different individuals. The entire Rorschach

Test was administered to each subject once. A week later, only cards I, IV, and VII were presented for response three times in a randomized order. The responses were scored on a modified scale in terms of the four dimensions, and the analysis was directed at showing the interrelationship among the variables composing each dimension. T. R. 30

Barmack, J. E. BOREDOM AND OTHER FACTORS IN THE PHYSIOLOGY OF MENTAL EFFORT: AN EXPLORATORY STUDY. *Arch. Psychol.*, July 1937, 218, 83pp. (College of the City of New York, N. Y.).

Oxygen consumption, systolic and diastolic blood pressure, and heart rate changes were studied together with changes in subjective reports on bored-interested, irritated-pleased, peppy-fatigued, relaxed-strained, attentive-inattentive, sleepy-awake, estimation of time, and per cent of time spent day-dreaming during two kinds of work. The first task was performance on a pursuit meter for 70 minutes. The second was composed of two tasks, one expected to be boring (adding pairs of six-place numbers) and one expected to be interesting (taking a series of intelligence tests). On the basis of the results, a theory of boredom is outlined. G. R. 63

Barmack, J. E. THE LENGTH OF THE WORK PERIOD AND THE WORK CURVE. *J. exp. Psychol.* July 1939, 25(1), 109-115. (College of the City of New York, N. Y.).

To study the relationship between initial rates of work and various long periods of work, 23 subjects were given a two and one-half hour practice period and then required to add pairs of six-place numbers for four, eight, twelve, and sixteen 15-minute periods. At the end of each period, subjective rating sheets were completed indicating feelings of boredom, strain, irritation, fatigue, sleepiness, and attentiveness. The number of problems completed (work rate) were compared for the four lengths of work periods. The feeling tone, as indicated from the rating sheets, was related to the work curve and length of work period. T. G.

Graybiel, A., Kerr, W. A. & Bartley, S. H. STIMULUS THRESHOLDS OF THE SEMI-CIRCULAR CANALS AS A FUNCTION OF ANGULAR ACCELERATION. *Amer. J. Psychol.*, Jan. 1948, LXI, 21-36. (USN School of Aviation Medicine, Naval Air Station, Fla.).

By use of the human centrifuge, records of responses both to constant angular acceleration and to changes in acceleration were obtained using the oculo-gyral illusion as an

indicator. Five subjects were tested individually for perception of apparent movement of a collimated star (no movement, left or right movement) under constant acceleration (ten revolutions per minute), acceleration, and deceleration. The responses were to mean conditions over periods of 20 seconds rather than to conditions of the moment. Relationships between direction and amount of change in angular acceleration as expressed in the three responses were analyzed. A threshold for change in acceleration was determined. T. G. R 15

5063

Armington, J. C. A NOTE CONCERNING THE VEG SCALE OF APPARENT WEIGHT. *Amer. J. Psychol.*, April 1953, 66(2), 304-306. (Walter Reed Army Medical Center, Washington, D. C.).

This note deals with an examination of the derivation of the formula for the veg scale of apparent weight. An apparent mathematical error is noted, the difficulty pointed out and a possible solution suggested. T. R 4

5082

Seitz, C. P. & Barmack, J. E. THE EFFECTS OF 10 MGS. OF BENZEDRINE SULFATE AND LOW OXYGEN TENSION ON THE SPAN OF ATTENTION FOR LETTERS, AND OTHER FACTORS. *J. Psychol.*, 1940, 10, 241-247. (University of Alabama, University, Ala. & College of the City of New York, N. Y.).

The attention span for letters of 18 male subjects was measured under three conditions: 1) normal air and a blank pill, 2) simulated altitude of 16,000 feet and a blank pill, and 3) simulated altitude of 16,000 feet plus ten milligrams of benzedrine sulfate. Each session was approximately one hour. The visual angle of the exposed material was seven degrees. Subjective rating sheets concerning feelings, attention, and the like were filled out at the end of each session. Differences in objective attention span and subjective ratings among the three conditions were analyzed. T. R 5

5092

Schmitz, M. A. THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VIBRATION ON HUMAN PERFORMANCE. Contract DA 49 007 MD 797, Prog. Rep. 2, Jan. 1959, 62pp. Bostrom Research Labs., Milwaukee, Wisc.

To investigate the effects of low frequency, high amplitude vibration (of the type found in work vehicles) on human performance, 18 subjects were exposed to vibrations (while seated on a wooden chair on a mechanical shake table) of 2.5 and 3.5 cps at two displacements for 90-minute periods. Pre- and post-control measures were taken before and after each session. Their

performance was compared to a no-vibration condition on these tests: 1) hand tremor, 2) visual acuity, 3) compensatory tracking, 4) foot pressure constancy, 5) foot reaction time, and 6) body equilibrium. One human subject and three dogs were exposed to frequencies in the one-to-eight cycle range and various physiological measurements were then made. T. G. I. R 25

5096

Stone, L. J. AN EXPERIMENTAL STUDY OF FORM PERCEPTION IN THE THERMAL SENSES. *Psychol. Rec.*, Oct. 1937, 1(19), 235-337. (Sarah Lawrence College, Bronxville, N. Y.).

To determine whether form perception was demonstrable and to study the laws governing such perception in an untrained modality (the thermal sense), twelve experiments were conducted. Both cold and radiant stimuli were used in solid or outline patterns of disk, rectangle, and triangle. Various portions of the body were stimulated and differing methods of report were required. Effect of instructions, knowledge of results, rewards, and practice were tested. A theory is suggested to explain the results. T. I. R 51

5098

Vallance, T. R. SUGGESTIBILITY OF SMOKERS AND NON-SMOKERS. *Psychol. Record*, Sept. 1940, 1V(10), 138-144. (Miami University, Oxford, Ohio).

To determine the presence or absence of a relationship between tobacco smoking and one measurable form of positive suggestibility, 47 subjects, of whom 25 were smokers and 22 were non-smokers, were tested for amount of body sway that could be induced by suggestion. Subjects were told that the purpose of the experiment was to determine their acuteness of equilibrium; the suggestion of falling or swaying forward was then given several times under conditions of voluntary eye-closing and a blindfold. Amount of body sway was measured and compared for smokers and non-smokers. T. G. R 3

5108

Arnoult, M. D. LOCALIZATION OF SOUND DURING ROTATION OF THE VISUAL ENVIRONMENT. *Amer. J. Psychol.*, Jan. 1952, LXV, 48-58. (University of Texas, Austin, Tex.).

To investigate the effect of visual-auditory interaction on the localization of sounds, the experience of rotating was induced visually by rotating the entire visual environment--a large striped cyclinder in which the subject was seated. Ten subjects tested individually were required to report the location of a sound in the horizontal plane under three conditions: 1) while experiencing rotation to the right, 2) the same

5110

to the left, and 3) while stationary. The sound stimulus was a loud buzz made by headphones placed in the horizontal plane at ten degree intervals (40 degrees left to 40 degrees right). Mean localizations, latencies, post-rotational effects, and eye movements were analyzed. T. G. R 11

5110

Baker, L.M. & Taylor, W.M. THE RELATIONSHIP UNDER STRESS BETWEEN CHANGES IN SKIN TEMPERATURE, ELECTRICAL SKIN RESISTANCE, AND PULSE RATE. *J. exp. Psychol.*, Nov. 1954, 48(5), 361-366. (Purdue University, Lafayette, Ind.).

To study the relationships between skin temperature changes and other physiological changes previously associated with emotional responses, polygraph recordings of skin temperature, skin resistance, and pulse were made of 52 subjects. Two conditions were used: 1) an assumed emotion-provoking (jumping electrical spark by means of an electric coil), and 2) induced muscular tension (hand dynamometer at subject's optional level). Changes in the three measures under the stress conditions were measured against the measures taken in a resting condition. T. R 19

5146

Wispe, L.G. PHYSIOLOGICAL NEED, VERBAL FREQUENCY, AND WORD ASSOCIATION. *J. abnorm. soc. Psychol.*, April 1954, 49(2), 229-234. (Ohio State University, Columbus, Ohio).

To study the relationship between association and physiological deprivation, 50 subjects were deprived of food and water for zero, ten, and twenty-four hours. A word association list of 24 words that had been matched for commonness and need-relevance was presented to each subject upon termination of the deprivation period. The number of act, object, instrumental, affective, and neutral word association responses were analyzed as a function of length of deprivation period. T. G. R 14

5215

Payne, R.B. & Hauty, G.T. THE EFFECTS OF EXPERIMENTALLY INDUCED ATTITUDES UPON TASK PROFICIENCY. *J. exp. Psychol.*, 1954, 47(4), 267-274. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

To examine experimentally the supposition that subjective dispositions affect task proficiency, 80 subjects received preliminary training on a complicated compensatory pursuit task involving simulated aircraft instruments and controls. They then continued work four hours after having been distributed among ten combinations of two motivational and five pharmacological conditions. The treatment effects were appraised in terms

of subjective dispositions and task performance, and the functional connection between these outcomes was explored. T. G. R 17

5227

Sell, R.G. & Motts, N.C. THE AMOUNT AND ORDER OF USE OF THE CONTROLLERS IN A STRIPPER CRANE. PE/NE/25/57, Aug. 1957, 17pp. The British Iron & Steel Research Association, London, England.

This report describes a trial carried out on a stripper crane to determine the amount and order of use of controllers. Records were made on punched tape every time the driver moved his controller. The tape was analyzed on an electric computer. On the basis of the findings a suggested layout of the controls in the cab was made. The techniques for study and analysis are discussed in detail and further trials are being arranged. T. 1.

5234

Wenzel, Bernice M. THE CHEMICAL SENSES. *Ann. Rev. Psychol.*, 1954, 5, 111-126. (Barnard College, Columbia University, New York, N.Y.).

This is a review of recent studies concerned with the chemical senses--gustation and olfaction. Under each sense, the work in neurophysiology, individual differences, studies on insects, and methods is reviewed. Industrial problems in olfaction are also included. R 59

5262

Brozek, J. CHANGES OF BODY COMPOSITION IN MAN DURING MATURITY AND THEIR NUTRITIONAL IMPLICATIONS. *Federation Proc.*, Sept. 1952, 11(3), 784-793. (University of Minnesota, Minneapolis, Minn.).

A study of changes in body composition taking place during the process of aging was made in an effort to increase the precision of description of the nutritional status, specifically its caloric aspect. The subjects were men of normal condition in two age groups: 18-25 and 45-54. Methods of measuring fatness were determinations of specific gravity and measurements of skin folds. The basic data on age differences in fatness are presented in tabular and graphic form. Some conclusions are drawn as to desirable caloric intake during maturity with tentative suggestions for suitable changes in present caloric intake tables. T. G. R 39

5280

Bernberg, R.E. SOCIO-PSYCHOLOGICAL FACTORS IN INDUSTRIAL MORALE: 1. THE PREDICTION OF SPECIFIC INDICATORS. *J. soc. Psychol.*, 1952, 36, 73-82. (Dept. of Psychology, Los Angeles State College, Los Angeles, Calif.).

Various tests of morale were constructed to analyze the relative predictive value of two major hypotheses for specific indicators in the work situation. The hypotheses were 1) that morale is a group phenomenon and 2) that morale is the acceptance of formal organization by members of the group. The indicators of morale were performance variables such as tardiness, short time absences, trips to medical aid unit for reasons other than injury or disease, and merit rating. Hourly-paid employees of a large aircraft manufacturing plant completed the questionnaires. Union and management established the qualitative criteria. T. R 8

5281

Bernberg, R.E. SOCIO-PSYCHOLOGICAL FACTORS IN INDUSTRIAL MORALE. III. RELATION OF AGE TO MORALE. *Personn. Psychol.*, Autumn, 1954, 7(3), 395-399. (Los Angeles State College, Los Angeles, Calif.).

To investigate differences in morale attributable to age, data from a study of 890 hourly paid employees of an aircraft plant were analyzed by making covariance adjustment for length of service in the work organization. Available data included age, length of service, and scores on two morale tests--a group test and an attitude test. A separate analysis was made with respect to each morale test when adjusted for age and for length of service. Suggestions are made for differential reward systems for younger and older workers. T. R 8

5316

Travis, R.C. VESTIBULAR SENSITIVITY TO INTERMITTENT PASSIVE ROTATION OF THE BODY. *Psychol. Monogr.*, 1928, XXXIX(2), 78-91.

To investigate vestibular sensitivity to changes in angular velocity of the head during passive rotation of the body, two subjects were tested using intermittent rotary movements as the stimuli. The subject, blindfolded and seated on a rotating platform, responded to the perception of motion by pressing the appropriate keys. The degree of angular displacement, interval between similar phases of stimulation, duration of the stimulus, and accelerations were varied and the results analyzed in a determination of the relationship between rapidity of stimulation, average acceleration, and correct response. T. G. 1.

5329

Jenkins, W. L. & Connor, Minna B. SOME DESIGN FACTORS IN MAKING SETTINGS ON A LINEAR SCALE. *J. appl. Psychol.*, Aug. 1949, 33(4), 395-409. (Lehigh University, Bethlehem, Penn.).

To investigate the design factors influencing the ease of setting a pointer on a

linear scale by means of a control knob, the subject was required to set the pointer to a position indicated by a lighted insert. Time consumed in making the setting and the relative action potential developed in the active forearm were measured separately for travel to approximate location and for final adjustment. Systematic variations in ratio, knob diameter, backlash, etc. were introduced. Three to five subjects were used in various parts of the study. Optimal design factors are discussed. T. G. 1. R 1

5339

Cofer, C.N. ANOTHER INVESTIGATION OF ASSOCIATIVE FACTORS IN REASONING. Contract NONR 397, Task III, Tech. Rep. 16, ca. 1952, 4pp. University of Maryland, Baltimore, Md.

The influence of past associative patterns on the frequency of pendulum type solutions to the Maier two-string problem was investigated. To obtain an index of past associative patterns, free associations were obtained to nine stimulus words, one of which was "rope". If a subject responded to this word with the word "swing" or some variant, he was assumed to have a "swinging" association that would facilitate the occurrence of pendulum type solution a week later on the two-string test. Test results were examined in terms of this hypothesis. T.

5340

Cofer, C.N. THEORETICAL AND GENERAL PROBLEMS IN RELATION TO VERBAL BEHAVIOR. FINAL REPORT. Contract NONR 397, NR 170 345, Task III, 1952, 6pp. University of Maryland, Baltimore, Md.

This final report summarizes briefly studies which have been made of certain aspects of verbal behavior itself and of its relationship to certain other psychological processes as follows: 1) verbal behavior and reasoning, 2) avoidance of certain thoughts, 3) verbal behavior and attitudes, and 4) studies of verbal behavior. A list of reports prepared under this research project is included. R 28

5345

Edwards, W. THE PREDICTION OF DECISIONS AMONG BETS. *J. exp. Psychol.*, Sept. 1955, 50(3), 201-214. (USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.).

This paper presents a very simple mathematical model for predicting choices among bets and an experiment in which that model is tested. The model is based on the concepts of utility and subjective probability and the theory of games. T. G. R 13

5346

Cowen, E. L. THE INFLUENCE OF VARYING DEGREES OF PSYCHOLOGICAL

STRESS ON PROBLEM-SOLVING RIGIDITY. *J. abnorm. soc. Psychol.*, April 1952, 47(2), 512-519. (University of Rochester, Rochester, N. Y.).

The hypothesis that increasing degrees of experimentally induced stress will elicit increasing amounts of problem-solving rigidity (tendency to adhere to an induced method of solution when it does not represent the most direct method), 75 subjects were assigned to a control, mild stress, or a strong stress group. All subjects took a water-jar test of problem-solving rigidity, on the basis of which four quantifiable rigidity indices were computed. Analysis of variance was used to study differences among groups on these measures. T. I. R 24

5347

Cowen, E. L. STRESS REDUCTION AND PROBLEM-SOLVING RIGIDITY. *J. consult. Psychol.*, Dec. 1952, XVI(6), 425-428. (University of Rochester, Rochester, N. Y.).

This is an exploratory study on the effects of reduction of induced stress perception on problem-solving rigidity. The design of the experiment was such as to induce a perception of stress in all subjects as they entered the criterion (problem solving) situation. This was achieved by administering a projective personality test and by advising subjects that those with maladaptive features would be called back for further testing. Fifty subjects from a larger group were selected at random and assigned alternately to a stress (informed their records were undesirable) or praise (informed their records were very good) group. Problem-solving rigidity was calculated from their subsequent scores on the water-jar test. T. R 14

5377

Borgatta, E. F., Bales, R. F. & Couch, A. S. SOME FINDINGS RELEVANT TO THE GREAT MAN THEORY OF LEADERSHIP. *Amer. Soc. Rev.*, Dec. 1954, 19(6), 755-759. (Russell Sage Foundation, New York, N. Y. & Harvard University, Cambridge, Mass.).

To explore some aspects of the great man theory of leadership, data gathered from 166 sessions of three-man groups are presented. The subjects were 126 Air Force personnel. The purpose of the sessions was represented as being the observation of how small groups work together and the task set was that of role-playing. Eleven great men were selected on the basis of their performance in the first session; the indices of performance were task ability (ratings from co-workers and I.Q. score), individual assertiveness (number of initiated acts per unit of time), and social acceptability (sociometric ratings). In subsequent sessions, as the great men were shifted about,

scores were obtained for great man and non-great man groups on productivity, tension, and solidarity. T. R 6

5395

Collier, R. M. THE CROSSED EFFECTS UPON VOLUNTARY MOVEMENT OF A UNILATERALLY INDUCED FATIGUE. *J. exp. Psychol.*, July 1938, 23(1), 26-44. (University of Vermont, Burlington, Vt.).

This experiment investigated "the crossed effects upon voluntary movements of a unilaterally induced fatigue." The experimental procedures were separated into two parts: 1) records which were taken alternately of both right and left forearm rotations, under each of the following conditions: a) no initial fatigue on either side, and b) initial contralateral fatigue; 2) apparatus used was modified to permit measurement of the durations of each of the four components of reciprocal movement, and records were made under each of three conditions. Four subjects each participated in 20 experimental periods. Results were discussed in terms of crossed effects of fatigue, relative variability, stability of movement, and effects of homolateral fatigue. T. G. I. R 29

5398

Brown, K. T. & Grether, W. F. THE EFFECTS OF PURE RED AND LOW-COLOR-TEMPERATURE WHITE INSTRUMENT LIGHTING UPON DARK-ADAPTED VISUAL THRESHOLDS. RDO 694 41, AF Tech. Rep. 6470, April 1952, 18pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

The effects of pure red and low color temperature white flood lighting upon completely dark adapted visual thresholds were determined. The red light was adjusted to brightness levels which pilots have been found to use as the minimal, normal, and maximal levels for night flying. For each brightness level of the red light, a brightness was found for the low temperature white light at which aircraft instruments were equally legible under the two lighting systems. Both a simulated instrument panel and a pure white panel were viewed. Six subjects were tested under each condition for changes in threshold from complete dark adaptation. T. G. I. R 5

5401

Conklin, J. E. SENDERSON RESPONSE-SEQUENCES. *Amer. J. Psychol.*, June 1954, 67(2), 363-365. (Ohio State University, Columbus, Ohio).

The assumption of response-independence at threshold for series of psychophysical judgments was tested on seven subjects. The method of constant stimuli was used, the subjects being instructed to report on intensive differences between standard and

IV 41

variable tones of 1000 cycles. Five equally spaced intensities were used as the variable--two above, two below, and one identical with the stimulus. Each subject made 100 judgments including 20 where the standard and variable were identical. Threshold responses were analyzed as a function of the preceding supra-threshold responses by autocorrelation method. G. R 2

5421

Carmichael, L., Kennedy, J. L. & Mead, I. C. SOME RECENT APPROACHES TO THE EXPERIMENTAL STUDY OF HUMAN FATIGUE. *Proc. nat. Acad. Sci.*, Dec. 1949, 35(12), 691-696. (Tufts University, Medford, Mass.).

This paper summarizes briefly three different experimental approaches to the study of fatigue and its characteristics as exhibited in the performance of the total normal adult human being. The first approach was the continuous recording of eye movements during long periods of reading and the testing of reading comprehension changes. A second approach was used to determine conditions under which a decrement could be measured in subjects performing certain military tasks. Sleep deprivation, hard physical labor, environmental stress were some of the factors studied. The third approach used a sensitive measure of muscle tonus to measure lapses in alertness under various conditions. R 14

5433

Corter, H. M. FACTOR ANALYSIS OF SOME REASONING TESTS. *Psychol. Monogr.*, 1952, 66(8), Whole 340, 1-31. (North Carolina State College of Agriculture and Engineering, Raleigh, N. C.).

An exploratory factor study in the general area of reasoning ability was undertaken. A battery of tests was devised which included subtests from several standardized tests such as Stanford-Binet Vocabulary Test, Wechsler Similarities and Comprehension Tests, and also tests devised by the author. All tests were administered to 100 subjects selected at random from the junior class of a large high school. From a correlation matrix, eight factors were extracted and interpreted. Lines of future research are suggested. T. I. R 42

5444

Flory, C. D. & Gilbert, Jane. THE EFFECTS OF BENZEDRINE SULPHATE AND CAFFEINE CITRATE ON THE EFFICIENCY OF COLLEGE STUDENTS. *J. appl. Psychol.*, April 1943, 27(2), 121-134. (Lawrence College, Appleton, Wisc.).

To evaluate the effects of benzedrine sulphate and caffeine citrate on speed of action, reading rate, reading comprehension, and thinking ability, 129 college students were divided into three groups equated as to

intelligence and sex. The three groups were administered one of the two drugs or a placebo (sugar or milk). Tests given over a 50-minute period were 1) tapping speed for ten seconds, 2) reading test for speed and comprehension, 3) a second tapping test, 4) multiple-choice vocabulary tests with a time limit imposed, and 5) a third tapping test. Differences in test scores among the three groups were analyzed for measurable drug effects. T. R 27

5452

Schreiber, R. J. GOOD CONTROLS DESIGN MAKES PILOT'S JOB EASIER. *Aviation Age*, Sept. 1953, 1p.

The problems of controls arrangement are discussed in this article and some basic rules for avoiding poor control design are enumerated. The following topics are covered: control-indicator relationships, natural design, ease of grasping, shape coding, switch design, and knob diameters. I.

5466

Hollander, E. P. & Bair, J. T. PRE-TRAINING ATTITUDES TOWARD AUTHORITY-FIGURES AS PREDICTORS OF INADEQUATE MOTIVATION AMONG NAVAL AVIATION CADETS. Rep. NM 001 058 05 05, Nov. 1952, 12pp. *USN School of Aviation Medicine*, Naval Air Station, Fla.

This report evaluates the predictive significance of pre-training attitudes toward authority figures. Cadets just entering the program were required to complete an open-ended questionnaire in which they were asked to describe their "best" and "worst" high school or college instructor. An analysis of their responses was made in terms of content categories: interpersonal relationships and teaching techniques. At the end of eight months, those cadets who had voluntarily withdrawn from the program were compared with those who remained. Implications for selection devices predictive of motivational status are included. T. G. R 3

5468

Hollander, E. P. & Bair, J. T. THE SIGNIFICANCE OF ATTITUDES TOWARD AUTHORITY-FIGURES IN DISCRIMINATING BETWEEN NAVAL AVIATION CADETS OF "HIGH" AND "LOW" MOTIVATION. Proj. NM 001 058 05 03, May 1952, 23pp. *USN School of Aviation Medicine*, Naval Air Station, Fla.

Attitudes toward authority-figures that discriminated between naval aviation cadets of "high" and "low" motivation were evaluated. The "high" motivation group consisted of 65 cadets who had successfully completed Basic Flight Training, and the "low" group included 72 cadets who withdrew from training voluntarily. Both groups were required to complete anonymously an open-ended

questionnaire form that instructed them to describe a sample of behavior characteristic of their best and worst instructors. Content analyses were made and frequencies for each content category determined for each group. T. G. I. R 15

5470

Husband, R. W. THE COMPARATIVE VALUE OF CONTINUOUS VERSUS INTERRUPTED SLEEP. *J. exp. Psychol.*, Dec. 1935, XVIII(6), 792-796. (University of Wisconsin, Madison, Wisc.).

To test the influence of interrupted sleep, a subject slept eight consecutive hours nightly for one month, and for the second month three hours, remained awake three, and then slept three more. Eleven mental and motor tests were administered each Saturday during both months. A physical examination was also taken each week at the same time. Test results and subjective reports were analyzed for differences due to sleep conditions. T. R 5

5471

Imus, H. A. SYMPOSIUM ON FATIGUE THE ERGONOMICS RESEARCH SOCIETY COLLEGE OF AERONAUTICS, CRANFIELD 24-27 MARCH 1952. Tech. Rep. ONRI 82 52, March 1952, 16pp. USN Office of Naval Research, London, England.

A three day symposium on fatigue is summarized. The discussions were initiated by defining fatigue and by raising the problem of measurement. The anatomical and physiological factors involved in fatigue, such as structure and function of muscles and bones, inadequate nutrition, and extremes of heat and cold and age, were described by various speakers. From the psychological point of view, such factors as motivation, satiation, frustration, practice, spaced learning, and alertness were discussed at length. Various aspects requiring further investigation by the psychologist were pointed out.

5480

Lorge, I., Tuckman, J., Aikman, L., Snegor, J., et al. SOLUTIONS BY TEAMS AND BY INDIVIDUALS TO A FIELD PROBLEM AT DIFFERENT LEVELS OF REALITY. *J. Educ. Psychol.*, Jan. 1955, 46(1), 17-24. (Columbia University, New York, N.Y.).

To estimate the difference in the quality of the solution to a practical field problem presented in four settings differing in their degree of remoteness from reality (verbal description, photographic representation, miniature scale model, with and without manipulation of parts and materials), ten teams of five men and ten men as individuals were asked to solve the problem at each of the four levels. The Mined Road Problem, which requires a plan for getting a group of five men across a mined road, was adapted for use. A quality point scoring system was

used to evaluate the written plans and the differences between group and individual solutions as well as among levels of remoteness from reality were analyzed. T. R 2

5506

Chalupsky, A. B. A/S PROCEDURAL ANALYSIS. XIII. A SUMMARY OF PROCEDURES. NP003014, PRFASD Rep. 45, March 1954, 8pp. USN Personnel Research Field Activity, San Diego, Calif.

A summary of the procedures used in gathering descriptive data on the sequential tasks of manipulation and operational maintenance of three basic sonar equipments (Sonar Indicator Control, Tactical Range Recorder, and Attack Plotter) is presented. Samples of record forms are included. I. R 6

5510

Darley, J. G., Gross, N. & Martin, W. C. STUDIES OF GROUP BEHAVIOR: FACTORS ASSOCIATED WITH THE PRODUCTIVITY OF GROUPS. Reprint Series 12. Laboratory for Research in Social Relations, University of Minnesota, Minneapolis, Minn. (Reprinted from: *J. appl. Psychol.*, Dec. 1952, 36(6), 396-403).

This is one of a series of papers reporting the results of a study of the relations among selected sociological and psychological variables in the behavior of small organized groups. An analysis of factors related to group productivity is presented here. The groups studied were 13 women's small residence units organized as a cooperative housing project. An attempt was made to get an estimate of relative productivity of the groups when engaged in a common and meaningful task--preparing a plan for better cooperative living--as a criterion measure against which certain group variables were correlated. T. R 3

5514

Eson, M. E. & Kafka, J. S. DIAGNOSTIC IMPLICATIONS OF A STUDY IN TIME PERCEPTION. *J. gen. Psychol.*, 1952, 46, 169-183. (New York State College for Teachers, Albany, N.Y. & Emory University, Emory University, Ga.).

In an attempt to relate time perception to other psychological phenomena, 76 subjects were required to estimate two time intervals (15 seconds, two minutes) under four conditions. These were: 1) a tone was heard for five seconds, after which the subject was directed to silence it (key pressing) for the estimated interval, 2) the subject was asked to switch off a light and keep spring switch down for the estimated interval, 3) the reverse of the preceding condition, and 4) the subject switched on the tone and listened to it for the estimated interval. No knowledge of results was given. Differences between estimated and clocked time were

analyzed for serial position and for differences among usual and unusual conditions. T. R. 34

5523

Hemphill, J. K. A PROPOSED THEORY OF LEADERSHIP IN SMALL GROUPS. April 1954, 35pp. Ohio State University, Columbus, Ohio.

A theory of leadership is outlined, limited in its range to an accounting for acts of leadership occurring within face-to-face groups, associations, or organizations. Attention is focussed upon acts identified as leadership acts and upon the behavior, attitudes, and expectations of the members of groups. Key theoretical concepts are defined and discussed and relationships between concepts are presented in outline form. A number of hypotheses are suggested which stem from the theory as formulated. T. I.

5524

Hemphill, J. K. & Sechrest, L. B. A COMPARISON OF THREE CRITERIA OF AIRCREW EFFECTIVENESS IN COMBAT OVER KOREA. J. appl. Psychol., Oct. 1952, 36(5), 323-327. (Ohio State University, Columbus, Ohio).

A study of three criteria of the performance of 94 B-29 aircrews that flew combat missions over Korea during the period extending from March to September 1951 is reported. The three criteria are 1) ratings by superiors of the performance of crews as units, 2) sociometric nominations from crew members, and 3) objective records of combat bombing accuracy. The criteria are described briefly, and compared in terms of their reliability and interrelationship. The general question of dependability of rating data as criteria is discussed. T. R. 2

5526

Hollingworth, H. L. THE INFLUENCE OF CAFFEINE ON MENTAL AND MOTOR EFFICIENCY. Arch. Psychol., April 1912, 22, 166pp. (Barnard College, New York, N. Y.).

An extensive series of tests on the influence of caffeine on a wide range of mental and motor processes is presented in this monograph. Sixteen subjects were studied over a period of 40 days; their performance in tests under a wide range of doses, of time, and of conditions of administration, was recorded and analyzed. Factors such as age, sex, weight, and previous caffeine habits were analyzed as they affected the caffeine influence. Other influences of caffeine, such as the effect on general health, quality and amount of sleep, and food habits were explored. T. G. R. 24

5527

Hollingworth, H. L. VARIATIONS IN EFFICIENCY DURING THE WORKING DAY.

Psychol. Rev., Nov. 1914, XXI(6), 473-491. (Columbia University, New York, N. Y.).

As part of an extensive 40-day study of human performance on a wide variety of tasks (from simple steadiness and tapping to complex numerical calculations), variations in efficiency during the working day were studied for 16 subjects. The data from two days of intensive work for ten subjects on 15 trials extending from 10:30 a.m. to 10:30 p.m. were analyzed as a function of time. T. G. R. 1

5528

Horwitz, M., Exline, R. V., Goldman, M. & Lee, F. J. MOTIVATIONAL EFFECTS OF ALTERNATIVE DECISION-MAKING PROCESSES IN GROUPS. Contract N6ORI 07144, June 1953, 77pp. USN Group Psychology Branch, ONR, Washington, D. C. (Bureau of Educational Research, University of Illinois, Urbana, Ill.).

This experiment was designed to test hypotheses concerning rate of psychological oversatiation among group members as a function of characteristics of their groups. The group characteristics were those presumed to affect the difficulty of decision in setting goals for the task. The task itself was a simple assembly of a jigsaw puzzle, repeated as often as possible over a two-hour period. Each member of the group was required to set a goal (speed and accuracy) for each repetition independently of other members of his group. Satiation was measured by means of degree of negative valence exhibited on successive rating scales of interest in the task. T. I. R. 12

5562

Plumb, R. E. ABOVE ELBOW PROSTHESIS WITH CHEST SADDLE PECTORAL CINEPLASTY AND CONVENTIONAL PROSTHESIS. TR 5804, Feb. 1958, 7pp. USA Prosthetic Research Lab., Walter Reed Army Medical Center, Washington, D. C.

This note describes and gives construction details for a special shoulder disarticulation arm. The prosthesis consists of an aluminum forearm and upper arm, chest saddle made of celastic, lined with horsehide and covered with leather with a shoulder joint attachment. This type prosthesis is applicable to above-elbow amputations and provides a normal range of movement. The first prosthesis made was worn continuously for a period of seven years. I.

5565

Davidson, A. L., Devoe, D. B., Spragg, S. D. S. & Green, R. F. ACCURACY OF KNOB SETTINGS AS A FUNCTION OF: I. THE PLANE IN WHICH THE KNOB TURNS; AND II. THE DIAMETER OF THE KNOB. Contract N6ONR 241, T.O. 6, Human Engng. Rep. SCD 241 6 8, Jan. 1953, 10pp. University of Rochester, Rochester, N. Y.

To determine how the plane in which the control knob rotates and the diameter of the knob affect accuracy of knob settings, an apparatus was constructed permitting the variation of plane of rotation, knob size, and size of angle. The limits of each angle were indicated by a pair of mechanical stops. The subject sampled the angle by turning first one way, next the other, and then made his final setting (bisection or duplication). In the first experiment, tests were made in three planes--front, side, and top. In the second, eight knob diameters, ranging from 0.5 to 5.0 inches, were used. In both, the angular extents tested were 20, 40, 80, and 160 degrees. Design recommendations are included. G. 1.

5589

Levi, M., Torrance, E. P. & Pletts, G. O. SOCIO-METRIC STUDIES OF COMBAT AIR CREWS IN SURVIVAL TRAINING. HFORL Memo. TN 545, Nov. 1953, 34pp. USAF Human Factors Operations Research Labs., Bolling AFB, Washington, D.C.

To investigate the relationship of combat crew performance to certain aspects of group structure and to gain a better understanding of the contribution of survival training to changes in group structure, socio-metric questionnaires were administered to 70 B-29 crews scheduled for assignment to combat duty. Questionnaires were administered before and after survival training. The questionnaires were based on confidence of aircrew members in themselves, in their leaders, and in other members of the crew. After these crews had flown combat missions over Korea, follow-up data were obtained on 36 of them. T. 1. R. 1

5592

McNamara, W. J. & Miller, R. E. EFFECT OF BENZEDRINE SULPHATE ON MENTAL WORK. *Psychol. Rec.*, May 1937, 1(7), 78-84. (University of Minnesota, Minneapolis, Minn.).

To investigate the effects of benzedrine sulphate upon efficiency of mental operations, written multiplication problems were administered to ten subjects divided into three groups. Four conditions were used: trials, with no pills, with benzedrine sulphate (20 milligrams), with lactose control pills, and a final set of trials with no pills. The number of trials for each condition varied from group to group but the order of conditions remained constant. Both work rate (number of problems completed) and subjective feelings (verbal reports) were studied for evidences of effect of the drug. T. R. 6

5614

Hollingworth, H. L. A COMPARISON OF ALCOHOL AND CAFFEINE. *Therapeutic Gazette*, Feb. 1921, 1-10. (Columbia University, New York, N. Y.).

This paper presents a brief report of a series of studies comparing the effects of alcohol and caffeine on the efficiency of various mental and motor processes. A group of six men were studied over a two-week period as they performed a wide variety of tasks from simple steadiness and tapping to complex numerical calculations. The alcohol dose varied from 13 to 118 cubic centimeters administered in the form of beer; control dosages were also given. The performance data were compared with those from an earlier study on caffeine (5615). T.

5615

Hollingworth, H. L. THE INFLUENCE OF CAFFEINE ON MENTAL AND MOTOR EFFICIENCY. *Therapeutic Gazette*, Jan. 1912, 1-16. (Columbia University, New York, N. Y.).

To determine the effect of caffeine on efficiency, 16 subjects were studied over a period of 40 days under carefully controlled conditions. By use of control squads and control doses on all members of the caffeine squads tests were made on capsules and solution doses of caffeine alkaloid, taken at various times of the day. A wide range of tests were administered which covered simple and complex psychomotor performances and intellectual performances. In addition to the quantitative data, subjective data on feelings of health and well-being were also collected and analyzed. This note describes the experiment and its findings in summary form. G.

5617

Hollingworth, H. L. THE INFLUENCE OF CAFFEINE ALKALOID ON THE QUALITY AND AMOUNT OF SLEEP. *Amer. J. Psychol.*, Jan. 1912, XXIII, 89-100. (Columbia University, New York, N. Y.).

As part of a larger study on the effect of caffeine on human efficiency over a period of forty days, each of the sixteen subjects kept daily records of his general condition of health and spirits, indicating any signs of bodily distress and mood together with the time of such occurrences. The approximate number of hours slept and the quality of sleep were recorded each day. Both caffeine alkaloid and placebos were administered on a schedule known only to the experimenter. These data were analyzed for effects of the drug in small and large doses, on a full or empty stomach, time of day and for individual differences in susceptibility. T.

5621

Fiedler, F. E. ASSUMED SIMILARITY MEASURES AS PREDICTORS OF TEAM EFFECTIVENESS. *J. abnorm. soc. Psychol.*, July 1954, 42(3), 381-388. (University of Illinois, Urbana, Ill.).

To test the hypothesis that group effectiveness is related to the interpersonal

perceptions which members of the group have toward one another, a series of correlated studies were made. Interpersonal perceptions were measured by correlating identical questionnaires which subjects were instructed to fill out 1) describing themselves, 2) predicting the responses of their preferred co-worker, and 3) predicting the responses of their rejected co-worker. The first studies used basketball teams and the last used surveying teams. Criteria of effectiveness were proportion of games won and instructor rating on accuracy respectively. The usefulness of this approach to team effectiveness is discussed. T. I. R 11

5629

Clark, B. & Graybiel, A. A DEVICE TO MANIPULATE AND TO INDICATE THE POSITION OF REMOTE TEST-OBJECTS. *Amer. J. Psychol.*, April 1952, 65(2), 286-287. (USN School of Aviation Medicine, Naval Air Station, Fla.).

This note describes a simple device which makes it possible for a subject and the experimenter to control a distant test-object independently and at the same time have an accurate record of the position of the target at any moment during the experiment. The advantages of the device for studies of visual space perception are listed. R 4

5639

Harvey, O. J. AN EXPERIMENTAL APPROACH TO THE STUDY OF STATUS RELATIONS IN INFORMAL GROUPS. *Amer. sociol. Rev.*, Aug. 1953, 18(4), 357-367. (University of Oklahoma, Norman, Okla.).

To determine whether the status and role relationships existing in small informal groups can be established by a short-cut experimental technique, ten adolescent cliques were selected on the basis of agreement among teachers' ratings, personal observations, and sociometric results. Three members from each clique--leader, middle, and lowest ranking members--were given the task of estimating their own future performance and that of the other two status occupants on an experimental task (dart throwing). Four of the groups were from a high and the others from a low socio-economic class. Correlations between overestimation on the task and group status, as well as socio-economic class, were interpreted in terms of level of expectation as related to standing in the group. T. R 15

5642

Jenkins, W. O. THE DISCRIMINATION AND REPRODUCTION OF MOTOR ADJUSTMENTS WITH VARIOUS TYPES OF AIR-CRAFT CONTROLS. *Amer. J. Psychol.*, July 1947, LX, 397-406. (Indiana University, Bloomington, Ind.).

This series of studies is concerned with the accuracy with which three groups of 20 blindfolded pilots are able to reproduce pressures ranging from one to fifty pounds with three types of controls--stick, wheel, and rudder-pedal. A group of 13 non-pilots and two other groups of pilots were further tested to determine the course of learning and the effects of lack of knowledge of results. The technique used was essentially the Method of Average Error. Implications for design of controls are discussed. T. R 1

5646

Kleemeier, R. W. & Dudek, F. J. A FACTORIAL INVESTIGATION OF FLEXIBILITY. *Educ. psychol. Measmt.*, Spring 1950, 10(1), 107-118. (Northwestern University, Evanston, Ill.).

To investigate the nature of flexibility, a battery of 13 tests was constructed. The tests were designed to measure numerical, perceptual speed, and verbal factors. Within each area an attempt was made to make some of the tests univocal (factorially pure) with one test designed to measure flexibility by requiring a shift from one simple task to another. Scores for 205 subjects were inter-correlated and the matrix of intercorrelations was factorially analyzed. The factors extracted were identified and discussed in relation to the postulated factor of flexibility. T. R 7

5647

US Department of Commerce. FEDERAL AIRWAY PLAN. FISCAL YEARS 1959-1963. Jan. 1958, 67pp. *US Dept. of Commerce*, Washington, D. C.

This report presents a plan for 1959-1963 indicating immediate improvements for expansion and modernization of the Federal Airway System. The plan is based on available equipments and known techniques with careful consideration being given to insure compatibility with new devices needed to cope with traffic in the future. The major parts of the report deal with the following topics: aviation activity, the present system, the operational improvement plan, plans for components of the airway system, maintenance and operation, and program cost summaries by fiscal years. T. G. 1.

5653

Kisch, R. N., Zemlin, R., Smith, B. D., Roberts, A. E., et al. AIR WARFARE ANALYZER. PROGRESS REPORT NO. 1. Contract AF 33(616) 2489, Proj. 2059, PX 71840, Feb. 1955, 18pp. Engineering Research Associates Div., Remington Rand, St. Paul, Minn.

Work to date on a design study for an "Air Warfare Analyzer," a system which provides to "players" the facility for playing war games with a certain degree of realism, is

reported. A report is appended which describes the problem and several basic mathematical expressions. A model air warfare game is developed from which an idea can be formed of the amount and kind of computational, input control, and output display facilities required. These requirements are discussed in general terms. T.

5660

Lofchie, S.H. THE PERFORMANCE OF ADULTS UNDER DISTRACTION STRESS: A DEVELOPMENTAL APPROACH. *J. Psychol.*, 1955, 39, 109-116. (Worcester State Hospital, Worcester, Mass.).

To investigate those factors which underlie performance under stress, an analysis was made of the conditions of psychomotor performance under distraction stress. The analysis led to a hypothesis, derived from developmental theory, that those subjects scoring higher on a Rorschach Index of Perceptual Maturity would be better performers on a psychomotor task administered under conditions of stress than would those subjects scoring lower on the same Index. Data were obtained with a group of 35 normal adults on a steadiness task in pre-stress and under stress (air blast, loud horn, flashing lights, etc.) and correlated with scores on the Index. R 21

5662

Melton, A.W. PSYCHOLOGICAL RESEARCH TO FILL MILITARY NEEDS. *Training Analysis & Dev. Info. Bull.*, Fall 1952, 3-14. (USAF Human Resources Research Center, Lackland AFB, Tex.).

This paper discusses the need of the military services for basic or fundamental research. Basic research is defined as research conducted in such a way that the scope of applicability of the results extends beyond the range of the particular set of circumstances involved in the investigation. The following topics are discussed: military requirements for psychological research, characteristics of the needed research, and finally, the advantages to psychology of military support.

5669

Siddall, G.J. & Holding, D.H. ERRORS OF AIM AND EXTENT IN MANUAL POINT TO POINT MOVEMENT. Rep. 63, Jan. 1956, 16pp. *Clothing & Stores Experimental Establishment*, Ministry of Supply, London, England.

To compare the magnitudes of errors of aim and errors of extent in simple discrete movements carried out at high rate and in different directions relative to the position of the body, 48 subjects were required to draw four lines in succession from a starting point to a target as fast as possible. Four directions of movement were compared. Errors

of extent (under- and over-shooting) and errors of aim (deviations to right or left) were recorded as was duration of movement. It is suggested that the results be considered as important for future design of displays and controls for certain specific equipments. T. I. R 20

5685

Fox, B.H. & Robbin, J.S. THE RETENTION OF MATERIAL PRESENTED DURING SLEEP. *J. exp. Psychol.*, Jan. 1952, 43(1), 75-79. (George Washington University, Washington, D.C.).

To investigate whether learning takes place during sleep, 30 subjects were divided into three equal groups: 1) a facilitation group which heard a different list of 25 words and correct equivalents repeated fifteen times during sleep, 2) a control group which heard music for an equal time during sleep, and 3) an interference group which heard 25 words and incorrect equivalents. Results were discussed as they related to previous studies in this area. T. R 13

5686

Gilchrist, J.C. THE FORMATION OF SOCIAL GROUPS UNDER CONDITIONS OF SUCCESS AND FAILURE. *J. abn. & soc. Psychol.*, April 1952, 47(2), 174-187. (University of Wisconsin, Madison, Wisc.).

To investigate one aspect of group formation under conditions of success and failure, 234 college students, divided into four treatment groups, were studied. Small groups of four subjects were studied as to their grouping choices (after failing or succeeding as individuals) when group action is required for further possible goal attainment. Under the guise of a test development program, various reasoning tests were used as the experimental tasks; thus an initial level of aspiration was provided for these student subjects. The frequencies of first and second task choices for the systematically varied success-failure conditions were analyzed. T. R 22

5687

Gilchrist, J.C. & Nesberg, L.S. NEED AND PERCEPTUAL CHANGE IN NEED-RELATED OBJECTS. *J. exp. Psychol.*, Dec. 1952, 44(6), 369-376. (University of Wisconsin, Madison, Wisc.).

A series of experiments were performed in the area of need and perceptual change in need-related objects. Specifically, the effects of hunger and thirst upon the luminance matches of projected pictures of food-related and liquid-related objects were investigated. T. G. R 6

5696

Gurnee, H. THE EFFECT OF A VISUAL STIMULUS UPON THE PERCEPTION

OF BODILY MOTION. *Amer. J. Psychol.*, Jan. 1931, XLIII, 26-48. (Western Reserve University, Cleveland, Ohio.)

To obtain both quantitative and qualitative data on the effect of a visual stimulus upon the perception of movement of the body, three subjects were used throughout a series of investigations. Sine-wave rotary oscillation of the body and of a simple visual object were used as stimuli. Reactions to independent bodily and visual movement were taken first (movement to right or left), bodily and visual situations were then combined, and the final series also combined the two situations with an additional visual stimulus. Verbal reports were given after each trial. T. G. R 12

5708

Hovey, H. B. EFFECTS OF GENERAL DISTRACTION ON THE HIGHER THOUGHT PROCESSES. *Amer. J. Psychol.*, Oct. 1928, 40, 585-591. (University of Oregon, Eugene, Ore.)

To investigate the effects of general distraction on higher thought processes, the six tests from Army Alpha, Form 8 were given to two groups (171 and 123 subjects respectively) under normal conditions. The same tests from Form 7 were given one and one-half months later to one group under conditions of severe general distraction and to the second group under normal conditions. Test scores were analyzed for effects of distraction, the relation of intelligence to performance under distraction, and individual differences in performance under distraction. R 17

5716

Kresse, F. H., Peterson, R. M. & Grant, D. A. MULTIPLE RESPONSE TRANSFER AS A FUNCTION OF SUPPLEMENTARY TRAINING WITH VERBAL SCHEMATIC AIDS. Contract AF 33(038) 23294, AFPTRC TN 55 34, Oct. 1955, 10pp. USAF Personnel and Training Research Center, Lackland AFB, Tex. (University of Wisconsin, Madison, Wisc.). (Reprinted from: *J. exp. Psychol.*, Nov. 1954, 48(5), 381-390.)

To test the hypothesis that verbal conceptualization would facilitate transfer of training from one method of coding on a display to another when the data coded (range, azimuth, and elevation of a simulated target) are the same, a task was developed which required the making of a three-component stick response to a stimulus pattern presented on an oscilloscope. Mechanically instructed groups were told what responses to make to change the pattern's location and character in a prescribed way, whereas the conceptually trained group were told that the patterns represented aircraft in different positions. Two different types of display were used. The 80 subjects were run in a trifactorial

design--display, instructions, and transfer. T. G.

5724

Luce, R. D. ON THE INTERACTION OF SUBOPTIMIZATION AND COMMUNICATION STRUCTURE IN GROUP PERFORMANCE. Nov. 1955, 20pp. Depts. of Mathematical Statistics and Sociology and Bureau of Applied Social Research, Columbia University, New York, N. Y.

This paper points to the need for a formal definition of a task-oriented group--a definition general enough to encompass in a natural way both the experimental and the life situations. It is suggested that a task-oriented group be treated as a suboptimizing device, that is, as a game with evaluation. Some experimental data on communication structure and group performance are discussed to illustrate the results obtained with such treatment. 1. R 4

5725

Moser, H., Dreher, J. J. & Oyer, H. J. ONE-SYLLABLE WORDS. Contract AF 19(604) 1577, AFRC TN 55 56, RF Proj. 664, Tech. Rep. 41, June 1957, 140pp. Ohio State University Research Foundation, Columbus, Ohio.

This report presents a systematic listing of the monosyllabic words in American English. These words represent, in the composite opinion of the compilers, all socially accepted monosyllabic words. Arrangement is according to sound with various markings indicating qualifications, such as words considered to be borderline between one and two syllables, words with two pronunciations, etc. Appended material includes a summary of occurrence of word counts, order of occurrence of sounds, a glossary of lesser-known words, and monosyllabic trade names of American manufacturers. T.

6626

Ramond, C. K. & Mighell, C. R. TARGET PLACEMENT ON A DETECTION PROFICIENCY COURSE. June 1954, 20pp. Human Resources Research Office, George Washington University, Washington, D. C. (USA Human Research Unit No. 3, Fort Benning, Ga.).

To design a precise and economical target detection course, the ranges of the minimum number of targets necessary to cover all discriminable ranges within any given interval were investigated. Each day for four days, 15 enlisted soldiers, aligned facing a level grassy field, made 60 estimates as to the relative closeness of two successively presented targets (human figures), one of which was either 2, 4, 6, 8, 10, 12, 14, 16, 18, or 20 yards more distant than the other. The subject's task was to record which target seemed nearer, the first or second. The near target in either

kneeling or standing position was 100 or 200 yards from the subject, who was either prone or standing. The data were analyzed to determine target separations beyond which no errors would occur. T. G. R 8

6882

Randle, R. J., Jr. VIBRATIONS IN HELICOPTERS: TRAINING CONSIDERATIONS. Proj. 7197, Task 71640, WADC TN 59 61, March 1959, 7pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

To study in detail the role that vibrations play in piloting helicopters, individual interviews were held with helicopter instructor pilots. Information was gathered about the classes of vibrations that exist during flight and which ones are utilized as cues in both normal control and the detection and diagnosis of system mal-functions. An analysis of the information led to a discussion of training considerations. Recommendations are made for simulation of each of the several classes of vibration in a proposed helicopter instrument trainer. T.

11, 033

Burns, W. & Littler, T. S. CONSERVATION OF HEARING IN OCCUPATIONAL NOISE. OPERATIONAL EFFICIENCY SUB-COMMITTEE HEARING PANEL. RNP 57/881, OES 292, HP 7, Oct. 1956, 7pp. Operational Efficiency Sub-Committee, RNP/RC, London, England.

This report presents a suggested specification of maximum sound pressure levels in seven frequency bands for avoidance of occupational deafness. Permissible ambient noise with ear protection is also specified. Other alternatives such as shorter equivalent periods of exposure are discussed. The tentative nature of the suggestions is pointed out. T. R 4

11, 040

Churchill, E., Kuby, A. & Daniels, G. S. NOMOGRAPH OF THE HAND AND ITS RELATED DIMENSIONS. Contract AF 33(616) 3841, WADC TR 57 198, April 1957, 49pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

This report brings together actual dimensions of the hand and interrelationships among these dimensions. Dimensional data for the hands of both male and female USAF personnel are summarized in tabular and graphic form. Intensities of the interrelationships within each of the two groups of dimensions are given in the form of tables of correlation coefficients. A series of tables supplies estimates of the other dimensions for the appropriate ranges of values of hand length, hand breadth at metacarpale, hand breadth at thumb, and fist circumference. Nomographic charts are presented for

estimating the related dimensions of likely combinations of hand lengths and breadths. T. G. I. R 9

11, 045

Weislogel, R. L. & West, E. D. A FEEDBACK SYSTEM FOR HUMAN ERROR INFORMATION. Contract AF 29(601) 124, Proj. 7800, AFSWC TR 55 12, Aug. 1955, 16pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

This report is based on the assumptions that reliability of special weapons systems can be increased through reduction of human errors and that reduction can be accomplished through a continuous flow of error data from operational sites to a central agency for evaluation and correction. A study of present practices in reporting was made to establish the frequency and consistency of human error reports within the Air Force. A field tryout of a special human error report form was conducted at an operating site for a three-week period. An analysis of the results led to a recommendation for a reporting system. I.

11, 139

Riblett, V. T. & Brown, A. H. EVALUATION OF PRODUCTION MODEL NO. 1 HAND, CHILD'S SIZE VOLUNTARY OPENING. Tech. Rep. 5808, April 1958, 6pp. USA Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.

A production model of a child-size voluntary opening hand was evaluated by testing on an automatic reciprocating machine and cycled at rate of 24 cycles per minute. At increments of 25,000 cycles, the hand was inspected for wear at the several pivot points, and measurements of the input and output forces and excursions were made. After the hand mal-functioned, it was disassembled and the mechanism examined. Recommendations for improvements are made. T. I.

11, 140

Sell, R. G. THE ERGONOMIC ASPECTS OF THE DESIGN OF CRANES. J. Iron & Steel Inst., Oct. 1958, 190, 171-177. PE/NE/81/58. (British Iron & Steel Research Association, London, England).

This report describes how cranes and crane cabs can be designed to suit the characteristics of the men who operate them. Methods are described by which the cab can be designed and sited on the crane structure to insure good visibility. Recommendations are made for the protection of operators from the poor physical conditions prevailing in many steelworks. Details are given of the anthropometric seat developed by the British Iron and Steel Research Association in

conjunction with the Medical Research Council. Research studies of the order, amount of use, and positioning of crane controls are described. Application of this information in the design of control points is made.

1. R 6

11, 259

Sell, R.G. & Box, A. THE POSITIONING OF THE CONTROLLERS ON THE 48 IN. MILL AT STEWARTS AND LLOYDS, CORBY. PE/NE/73/57, March 1958, 12pp. Plant Engineering and Energy Division, The British Iron & Steel Research Association, London, England.

This report describes a test carried out in the steelworks of Stewarts and Lloyds, Corby, to determine the optimum positions of the controllers for their new 48 inch mill. (The type of controllers and their general positioning had been decided before this ergonomics test was made.) The trial was carried out by means of a mock-up of the mill controls. This consisted of full size models of the controllers which could be adjusted and fixed in position to suit the convenience of each operator. Recommendations are made on the basis of this trial for the positioning of controllers in the actual mill situation.

T. 1. R 2

11, 279

Lecomte, P. L'ACCROISSEMENT DE LA PRECISION A L'ATTERRISSAGE PAR L'EMPLOI D'INDICATEUR D'INCIDENCE. Rep. 30, Feb. 1956, 16pp. Advisory Group for Aeronautical Research & Development, NATO, Paris, France.

Landing on relatively short runways raises various technical problems. The present report gives details on the use of the angle of attack indicator for approach and on the advantages from the point of view of a decrease in approach speeds and an increase in the accuracy of touchdown. T. 1.

11, 281

McKnight, F.S. A PRELIMINARY STUDY OF OPERATIONAL ADVANTAGES OF PICTORIAL NAVIGATION DISPLAYS. Proj. 6 2 5, Tech. Dev. Rep. 241, June 1954, 26pp. Technical Development & Evaluation Center, CAA, Indianapolis, Ind.

In the preparation of an evaluation program for three types of pictorial computers, a study of possible applications of these navigation displays to operational problems was made with particular emphasis on application to air traffic control problems. The three pictorial computers (or displays) had a common principle in that they display omnibearing-distance information in pictorial form with the position of an aircraft plotted directly on an aeronautical chart by a position indicator. The advantages of these displays when compared to conventional symbolic instrumentation are discussed. The effects

of possible navigation errors when the displays are used with very-high-frequency omnirange/distance-measuring equipment (VOR/DME) are considered. T. G. 1. R 5

11, 283

Blout, E., Dowling, C.E., Kay, H., McCormick, R.E., et al. TECHNICAL AND OPERATIONAL EVALUATION OF THE TYPE IV PICTORIAL-DISPLAY EQUIPMENT. Proj. 6 2 Tech. Dev. Rep. 242, June 1954, 32pp. Technical Development & Evaluation Center, CAA, Indianapolis, Ind.

This report describes the technical and operational evaluation of the Type IV rotatable-panel pictorial display, a navigational aid for use in aircraft equipped with visual omnirange and distance measuring equipment and with a Gyrosyn compass. The display plots the track of the aircraft on a map and simultaneously indicates the heading; course-line-computer indications are also available. Laboratory tests were made of bearing, distance, and heading accuracy as well as physical aspects of the equipment. Accuracy of the display under actual flight conditions was determined and the ability of the pilot to comply with current navigation and traffic-control procedures was established. Recommendations are included. T. G. 1. R 5

11, 309

Clark, W.A. & Farley, B.G. GENERALIZATION OF PATTERN RECOGNITION IN A SELF-ORGANIZING SYSTEM. Proc. Western Joint Computer Conference, March 1955, 86-91. (Lincoln Lab., Massachusetts Institute of Technology, Lexington, Mass.).

A self-organizing system reported in a previous paper is described briefly. The behavior of the system was simulated by means of a digital computer--the Memory Test Computer of the Lincoln Laboratory. Two further experiments are described here: the first to demonstrate that self-organization still takes place even if the input patterns are subjected to considerable variation; the second to show that after organization with the usual fixed pattern, the system classifies other input patterns statistically according to a simple preponderance pattern. The significance of the results as a generalization in pattern recognition is discussed and some remarks are made on simulation of such systems and its relation to computer design.

1. R 1

11, 378

Massey, Iris H. & Creager, J.A. VALIDATION OF THE AIRMAN CLASSIFICATION BATTERY: 1949-1953. Proj. 7700, Task 77006, AFPTRC TN 56 129, Nov. 1956, 17pp. USAF Personnel Research Lab., Lackland AFB, Tex.

This report summarizes the available data on the validation of the Airmen Classification Battery from 1949 to 1953. It includes

citations of published references on the characteristics of individual tests and batteries, and it presents data not previously reported in published form. T. G. R 42

11, 379

Barron, F. THE DISPOSITION TOWARD ORIGINALITY. *J. abnorm. soc. Psychol.*, Nov. 1955, 51(3), 479-485. AFPTRC TN 56 122. (Institute of Personality Assessment & Research, University of California, Berkeley, Calif.).

To explore relationships between originality and personality organization, a study of two groups of 100 Air Force captains was made. A consistently original group and a consistently unoriginal group were selected on the basis of responses to eight tests which could be scored objectively or rated reliably. An original response was defined as one that is both uncommon to the sample under study and, at the same time, adequate for the realistic demands of the problem. Five major hypotheses and the 15 derived predictions concerning originality, which had been suggested by previous related findings, were tested by comparing the two groups in terms of relevant personality data gathered during a three-day living-in assessment study. T. R 11

11, 383

USA Library. GLOSSARIES. A PRELIMINARY SURVEY OF SELECTED TITLES OF TECHNICAL AND SCIENTIFIC, DOMESTIC AND FOREIGN TERMS AND DEFINITIONS EMPLOYED BY THE DEPARTMENT OF DEFENSE. Spec. Biblio. 5, May 1956, 27pp. USA Library, Adjutant General's Office, Washington, D. C.

A preliminary list of official reports and publications of the Department of Defense and other Federal agencies is presented. These reports and publications are either glossaries in their entirety or do contain definitions or glossaries. The page numbers are included in the latter case. Although emphasis was placed on glossaries appearing since 1947, some older glossaries are included because of their additional contribution. In general, the glossaries are 1) pertinent to the field of supply and logistics, 2) used in administrative, technical, and scientific fields, and 3) used in connection with research requiring the knowledge of foreign languages. R 280 (approx.)

11, 397

Fletcher, Dorothy E. HUMAN ENGINEERING INVESTIGATIONS OF AIRCRAFT COCKPIT VISUAL DISPLAYS. PART 8, SUGGESTIONS FOR THE FORM OF THE AIRCRAFT SILHOUETTE OF THE KEARFOTT DIRECTIONAL HORIZON. TED Proj. NAM AE 7047, NAXSTA Rep. XG T 204, Aug. 1954, 16pp. USN Aero Medical Equipment Lab., NAMC, Philadelphia, Penn.

This report considers the design of the aircraft silhouette which appears on the Kearfott Directional Horizon instruments, 6N-1AM and 6N-1BM. These instruments combine attitude and directional information in one display; attitude appears as a relatively pictorial display as compared to the more symbolic display of directional information. The aircraft silhouettes are analyzed in terms of legibility improvements that might be made. Suggested changes are discussed with photographs attached. I. R 2

11, 401

Sedgwick, R. R. CHAIR, FOLDING, METAL: TEST OF. Proj. T 1021, March 1954, 23pp. USMC Development Center, Marine Corps Schools, Va.

A folding metal chair was tested and evaluated in comparison with the standard Marine Corps Chair, Folding (canvas) for suitability for Marine Corps use. The following tests were conducted: 1) physical characteristics, 2) stowability, 3) durability and stability, 4) maintenance requirements, 5) user acceptability, and 6) suitability for Marine Corps use. Recommendations regarding acceptance of the new chair are made. I.

11, 856

Krendel, E. S. THE MECHANICAL POWER OUTPUT OF MEN. Contract NONR 2180(00), Proj. NR 196 006, Final Tech. Rep. FA1982, Jan. 1958, 86pp. Franklin Institute Laboratories, Philadelphia, Penn.

A scheme for designing man-powered devices for optimal power transfer from the human operator to the mechanism is discussed. Data indicating the feasibility of such a design are presented. Such data as were available for unusually high as well as for average power production in cranking, pedaling, and other tasks are presented in a systematic fashion. T. G. R 62

12, 226

Olsen, R. A. CRITICAL ANALYSIS OF SYNTHETIC MOTION TIME VALUES AS DEVELOPED BY MOTION PICTURE ANALYSIS. Jan. 1957, 12pp. Pennsylvania State University, Philadelphia, Penn.

To explore the accuracy of the motion picture camera as a means for determining synthetic motion time values, an operation was studied by means of the electronic touch detector simultaneously with the motion picture camera (1000 feet per minute). The tape as produced by the touch detector was then compared to the time values as recorded on the film. Differences in end points were average for each movement element. The pattern of differences obtained by the two methods is discussed. T.

12, 234

Page, H. E. NATIONAL INSTITUTE FOR EDUCATIONAL RESEARCH, DENMARK.

ONRL TR 3759, April 1959, 3pp. USN Office of Naval Research, Branch Office, London, England.

Danmarks Paedagogiske Institut of Copenhagen was established in 1954. This paper sets forth the duties of the Institut, the make-up of the management staff, and the type of research program undertaken. Several investigations, either completed or in progress, are discussed to indicate the scope of the research program.

12,473

Peters, G. A. WHEN CHOOSING SELECTOR-SWITCH KNOBS. Prod. Engng., Dec. 1958, 29(50), 103. (Psychological Research Associates, Inc., Santa Monica, Calif.).

This design sheet presents tips to the design engineer on the selection of selector-switch knobs for easy reading and positioning. Illustrations accompany the suggestions. 1.

12,594

Peters, G. A. & Michelson, S. SELECTING CONTROL DEVICES FOR HUMAN OPERATORS. Control Engng., March 1959, 6(3), 127. (Psychological Research Associates, Inc., Santa Monica, Calif.).

A simplified chart for use as a design guide in selecting control devices for human operators is presented. Only the more common control devices are listed (toggle switch, push button, rotary selector switch, knob, crank, lever and handwheel) with accompanying information on task requirements, task examples, common applications, necessary design features of the device, and human factors application of the devices. T.

12,795

Winick, D. L., Nolan, C. Y. & Bernstein, B. B. A SURVEY OF ORGANIZATIONAL MAINTENANCE OF THE MEDIUM TANK. Contract DA 44 109 QM 650, DA Proj. 095 30 000, Tech. Rep. 45, May 1958, 35pp. Human Resources Research Office, George Washington University, Washington, D. C.

As one step in improving the maintenance of armor equipment, a study was made of organizational maintenance and of tank maintenance problems and training methods. The M48 tank equipment system, types of maintenance operations, and maintenance activities of organization personnel in four tank battalions were studied. The data were obtained from experienced maintenance personnel, from personnel on the job in the four battalions, and from maintenance records. These data were analyzed to produce an estimate of the maintenance activity reported in the unit records and a description and frequency estimate of actual maintenance activities of first and second echelon personnel. Training methods were also studied. T. G.

12,967

Ritter, O. L. & Gerathewohl, S. J. THE CONCEPTS OF WEIGHT AND STRESS IN HUMAN FLIGHT. Rep. 58 154, Jan. 1959, 10pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

The concepts of weight and stress in human flight are considered. The usage of terms and expressions is analyzed, their diverse meanings disentangled, and some of the physical facts are presented together with a simple and consistent set of concepts for their description. T. I. R 15

13,000

Garvey, W. D. & Taylor, F. V. INTERACTIONS AMONG OPERATOR VARIABLES, SYSTEM DYNAMICS, AND TASK-INDUCED STRESS. J. appl. Psychol., April 1959, 43(2), 79-85. (USN Research Lab., Washington, D. C.).

Three experiments were conducted to determine the effect of stressing the human element in each of three man-machine systems (manual tracking) on the performance of these systems: 1) acceleration control and acceleration-aided control system, 2) same as in 1) but with poor and good subjects, 3) acceleration control and position control system. Forty-eight subjects (16 per experiment) were trained on the respective systems and then required to operate them under a series of task-induced stress conditions (seven). Performance was analyzed by Wilcoxon's comparison of several treatments test. T. G. I. R 8

13,001

Harrison, H. J. EFFECTS OF NOISE ON HUMAN PERFORMANCE. J. appl. Psychol., April 1959, 43(2), 96-101. (Antioch College, Yellow Springs, Ohio).

The effects of noise level (80 decibels (db)-quiet, 110 db-noise) on a vigilance task (monitoring clocks), a complex mental counting task (counting number of flashes on each of several lights), and a time judgment (estimating passage of a ten-minute interval) were studied. The results were analyzed by analysis of variance technique. These effects are discussed in terms of noise as a source of psychological stress. T. G. I. R 16

13,002

Mecherikoff, M. & Horton, D. L. PREFERENCES FOR LETTERS OF THE ALPHABET. J. appl. Psychol., April 1959, 43(2), 114-116. (Westmont College, Santa Barbara, Calif. & University of Minnesota, Minneapolis, Minn.).

To determine whether or not consistent letter preferences exist and if so which may be considered approximately equal to each other in appeal, 182 subjects rated seven letters presented pairwise in all combinations. These seven were selected as least

13,003

likely to differ in appeal from results of preliminary studies. Results were tested for significance and presented as a function of letter, position and sex. T. G. R 4

13,003

Martindale, R.L. & Lowe, W.F. USE OF TELEVISION FOR REMOTE CONTROL: A PRELIMINARY STUDY. *J. appl. Psychol.*, April 1959, 43(2), 122-124. (USAF Special Weapons Center, Kirtland AFB, N.M.).

To determine the effects on accuracy of performance using television for remote control when the visual field was systematically displaced at several angles and when visual orientation was normalized, but proprioceptive cues were systematically altered by angular displacement of the television camera, 15 males followed a pursuit rotor target with a stylus while viewing this on a television monitor screen. Scores for the various experimental conditions - mean time on target - were analyzed by analysis of variance technique. T. I. R 1

13,004

Churchill, A.V. OPTIMAL INTERVAL LENGTH FOR VISUAL INTERPOLATION: THE EFFECT OF VIEWING DISTANCE. *J. appl. Psychol.*, April 1959, 43(2), 125-128. (Defense Research Medical Labs., Toronto, Ontario, Canada).

To determine: 1) optimal length of interval for interpolating in tenths, 2) effect of viewing distance on optimal interval length, 24 subjects interpolated to nearest unit on seven horizontal scale intervals (from 0.25 to 3.0 inches long) at each of three viewing distances - 26, 56 and 84 inches, with the dimensions of the component parts constant and with them made proportional (same visual angle) at the different distances. Errors were analyzed by analysis of variance. The results are discussed in terms of the "law" of the visual angle. T. G. R 3

13,005

Bradley, J.V. DIRECTION-OF-KNOB-TURN STEREOTYPES. *J. appl. Psychol.*, Feb. 1959, 43(1), 21-24. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

To determine whether the principle that rotary controls should turn clockwise to increase volume, power, and so forth, corresponds to a true "population stereotype" or represents merely a convention adopted for purposes of standardization, 300 subjects were asked to grasp a knob and turn it so as to effect a specified change in intensity of a light mounted above it. Additionally, 30 right-handed and 30 left-handed subjects were asked simply to "turn the knob." Results are presented and discussed in terms of sex difference, effect of handedness, existence of a strong turn-

clockwise-to-increase stereotype, and effect of phraseology on strength of clockwise-to-increase stereotype. T. R 6

13,006

Ross, S., Dardano, J. & Hackman, R.C. CONDUCTANCE LEVELS DURING VIGILANCE TASK PERFORMANCE. *J. appl. Psychol.*, Feb. 1959, 43(1), 65-69. (University of Maryland, Baltimore, Md.).

The following questions were investigated in this study: 1) Does the conductance change during a vigilance task exhibit a systematic trend? 2) If changes in conductance exhibit a systematic pattern will the pattern be unique for the individual or descriptive of all subjects? 3) Is the conductance trend related to efficiency in performance? Change in basal conductance was used as the indicator of activation level; nine subjects were required to detect double jumps of a clock pointer and respond by pressing a switch. Individual conductance trends are analyzed as they relate to performance. T. R

13,007

Hodge, M.H. THE INFLUENCE OF IRRELEVANT INFORMATION UPON COMPLEX VISUAL DISCRIMINATION. *J. exp. Psychol.*, Jan. 1959, 57(1), 1-5. (University of Virginia, Charlottesville, Va.).

The purpose of this study was to determine whether increasing amounts of irrelevant information that is relevant under other conditions is detrimental to performance of a complex discrimination task; whether effect of irrelevant information is increased as the discrimination of the relevant information is made more difficult, and whether the effect of irrelevant information is reduced by practice. Thirty subjects were requested to identify one of 16 complex geometric patterns to which irrelevant dimensions had been added. Response latencies were subjected to analysis of variance and tested for significance. T. G. I. R 4

13,008

Castaneda, A. & Lipsitt, L.P. RELATION OF STRESS AND DIFFERENTIAL POSITION HABITS TO PERFORMANCE IN MOTOR LEARNING. *J. exp. Psychol.*, Jan. 1959, 57(1), 25-30. (Iowa Child Welfare Research Station, State University of Iowa, Iowa City, Iowa).

To determine the relation of stress (time pressures) and pre-experimentally acquired differential position habits to performance in a motor-learning task, 108 fifth-grade children were randomly assigned to stress and non-stress groups, and asked to perform a simple motor-learning task. Data were analyzed in terms of percentages of correct responses and analysis of variance is made of correct responses. Results are discussed as they relate to the role of

drive in situations involving competing responses based on Hull's assumption concerning the manner in which drive and habit combine to determine response strength.
R 9

13, 009

Goodrich, K. P. PERFORMANCE IN DIFFERENT SEGMENTS OF AN INSTRUMENTAL RESPONSE CHAIN AS A FUNCTION OF REINFORCEMENT SCHEDULE. *J. exp. Psychol.*, Jan. 1959, 57(1), 57-63. (State University of Iowa, Iowa City, Iowa).

To test the hypothesis that the asymptotic probability of a subject's predicting the occurrence of the more frequent event in a two-choice uncertain outcome situation is a function of the level of reinforcement present in the situation, such that probability of predicting the more frequent event will tend toward unity as rewards and costs of correct and incorrect predictions are increased, 36 subjects were randomly assigned to one of three conditions (no pay-off, reward, and risk). Each were presented a 100-trial series in which order of occurrence of two events was randomized. Results are discussed as they relate to decision theory.
T. R 17

13, 010

Kappauf, W. E. & Powe, W. E. PERFORMANCE DECREMENT AT AN AUDIO-VISUAL CHECKING TASK. *J. exp. Psychol.*, Jan. 1959, 57(1), 49-56. (University of Illinois, Urbana, Ill. & USAF Personnel and Training Research Center, Lackland AFB, Tex.).

To determine whether performance at an audio-visual checking task would change with time, and whether such changes would be related to (1) rate of occurrence of discrepancies in the digit series or to (2) aptitude level of the subject, 235 subjects were tested on an audio-visual digit checking task which continued for two hours. Results are discussed as they relate to general aptitude test scores, and, more generally, as they relate to other studies in this field. Suggestions were made for further studies which are needed. G. R 4

13, 011

Gordon, N. B. LEARNING A MOTOR TASK UNDER VARIED DISPLAY CONDITIONS. *J. exp. Psychol.*, Feb. 1959, 57(2), 65-73. (New York University, New York, N. Y.).

To examine the hypothesis that learning in perceptual-motor tasks is a function of the nature of the information contained in the stimulus inputs, 160 males (divided into 16 subgroups) performed identical two-handed tracking in the context of four variations of stimulus input: 1) pursuit, 2) compensatory, 3) pattern memory, 4) response memory. Each subgroup received initial training on

one task and subsequently was transferred to the same or a different task; all possible combinations were employed, namely 16. Error scores were subjected to analysis of variance. The results were discussed as they relate to transfer of training.

T. G. I. R 9

13, 012

Brandalise, B. B. & Gottsdanker, R. M. THE DIFFERENCE THRESHOLD OF THE MAGNITUDE OF VISUAL VELOCITY. *J. exp. Psychol.*, Feb. 1959, 57(2), 83-88. (University of California, Los Angeles, Calif.).

To make a new assessment of the difference threshold of the magnitude of visual velocity, ten subjects adjusted the rate of one (comparison) of two rotating black discs (velocities of 10, 20, 30, 60, 90 revolutions per minute) so as to equate the velocity of the two white dots located near the edge of each disc. The standard deviation of adjustment was the threshold measure employed; an analysis of variance was performed. These findings were compared with those of other researchers; differences in experimental methods and individual variability were discussed. T. I. R 6

13, 013

Edwards, W. INFORMATION AND AUTOKINETIC MOVEMENT. *J. exp. Psychol.*, Feb. 1959, 57(2), 89-90. (University of Michigan, Ann Arbor, Mich.).

To examine the hypothesis that autokinetic movement occurs if the visual world is highly redundant and not if it is full of information, 20 subjects (after 10 minutes dark adaptation) viewed a pattern of 289 lighted holes which were arranged either disorderly (randomly) or orderly and pressed a button when movement of the pattern began. Amounts and latencies of movement were recorded. The findings were examined in light of the above hypothesis. R 2

13, 014

Stevens, S. S. & Stone, Geraldine. FINGER SPAN: RATIO SCALE, CATEGORY SCALE AND JND SCALE. *J. exp. Psychol.*, Feb. 1959, 57(2), 91-95. (Harvard University, Cambridge, Mass.).

To determine, by method of magnitude estimation, how subjective thickness varies with width of objects grasped between thumb and middle forefinger, and to compare this with category and Fechnerian scales constructed from just noticeable differences (jnd), about 33 subjects made these judgments by: 1) assigning numbers to blocks proportional to their apparent thickness (5 to 65 millimeters (mm.) in 5 mm. steps), the standard block being presented before each variable block or only at beginning of series (12 blocks); 2) assigning numbers between one and seven, having been presented

13,015

with both one and seven for reference; 3) assigning "long"- or "short"-method of single stimuli with two stimuli and two categories. The above three scales were constructed and compared. G. R 8

13,015

Vanderplas, J. M. & Garvin, E. A. THE ASSOCIATION VALUE OF RANDOM SHAPES. *J. exp. Psychol.*, March 1959, 57(3), 147-154. (Washington University, St. Louis, Mo.).

To assess the interaction of association value and stimulus complexity as determinants of recognition, 50 subjects viewed 180 random shapes (30 at each of six complexity levels) and responded with a word, phrase or yes if these reminded them of something and no if they did not. Associative values, content values and heterogeneity indices were thus computed for each shape, and a contingency analysis on associative value as a function of complexity level was conducted. Correlations between pairs of variables, for example complexity and content, were also computed. T. G. I. R 6

13,016

Vanderplas, J. M. & Garvin, E. A. COMPLEXITY, ASSOCIATION VALUE, AND PRACTICE AS FACTORS IN SHAPE RECOGNITION FOLLOWING PAIRED-ASSOCIATES TRAINING. *J. exp. Psychol.*, March 1959, 57(3), 155-163. (Washington University, St. Louis, Mo.).

To study the effects of four levels of practice in labelling on the recognition of random shapes of three levels of complexity and three levels of association value, 144 subjects (four for each of 36 conditions) first attempted to learn a nonsense label for each of a set of eight random shapes (complexity level same and associative value about same for a given subject). Next the subject attempted to select from a group those shapes for which he had learned labels in part one. For the four levels of practice, means and standard deviations were computed. For the recognition task, mean number and time of responses for: 1) correct recognitions, 2) correct rejections and 3) incorrect rejections were computed; separate analyses of variance were carried out for each of these three classes of response. T. G. I. R 15

13,017

Charles, J. P. & Duncan, C. P. THE DISTANCE GRADIENT IN KINESTHETIC FIGURAL AFTEREFFECT. *J. exp. Psychol.*, March 1959, 57(3), 164-170. (Northwestern University, Evanston, Ill.).

To obtain quantitative measurements of kinesthetic figural after-effect (FAE) and to determine if a distance gradient in FAE similar to that in vision occurs in kinesthesia, each of nine groups (20 subjects/group) judged one of nine widths of blocks by: 1) making

four judgments of test block (constant error data), 2) inspecting different block for one minute by running thumb and forefinger along sides, 3) judging test block with same hand by adjusting scale with other hand, 4) one minute rest, 5) inspecting as in 2, and 6) judging as in 3. A control group without inspection also was run. Trend analyses were used to test FAE and distance gradients. Also, analysis of variance using successive blocks of trials was performed to further check on practice effects. T. G. R 10

13,018

Stevens, S. S. CROSS-MODALITY VALIDATION OF SUBJECTIVE SCALES FOR LOUDNESS, VIBRATION, AND ELECTRIC SHOCK. *J. exp. Psychol.*, April 1959, 57(4), 201-209. (Harvard University, Cambridge, Mass.).

To compare the dynamic characteristics of three different sense modalities, numerical ratio scales of subjective magnitude for loudness, vibration and electric shock were used to predict the form of equal-sensation functions that should result from matching apparent intensity in any two of these modalities. About 30 subjects served in one or another parts of experiment. Cross-modality matches were made between each modality. Comparisons between predicted and experimental functions were made. G. I. R 17

13,019

Stevens, S. S. TACTILE VIBRATION: DYNAMICS OF SENSORY INTENSITY. *J. exp. Psychol.*, April 1959, 57(4), 210-218. (Harvard University, Cambridge, Mass.).

To determine, by the method of magnitude estimation, how subjective intensity of a vibratory stimulus varies with amplitude of vibration applied to finger and to arm and to compare the function obtained on finger with category scale and Fechnerian scale constructed from just noticeable differences (jnd), six experiments were performed using between ten and 12 subjects. The judgments yielded ratio, category and jnd scale for 60 cycles per second vibration applied to the finger and a ratio scale for the arm. These scales are compared and discussed in terms of possible mechanisms involved. G. R 22

13,020

Stewart, E. D. THE GELB EFFECT. *J. exp. Psychol.*, April 1959, 57(4), 235-242. (University of Texas, Austin, Tex.).

To examine the parameters that affect the Gelb phenomenon, within the framework of Helson's adaptation level theory - particularly the contrast principle, four subjects made judgments as to the appearance of the Gelb disk (by adjusting a measuring disk from 360 degrees white to 360 degrees black) when three different sizes of white disks were suspended in front of the Gelb disk. (Position of white disk in relation to Gelb

disk varied from center to tangent). Equations for the data were determined, and the findings were discussed in terms of the laws of lightness-contrast. T. G. I. R 16

13,022

Digman, J. M. GROWTH OF A MOTOR SKILL AS A FUNCTION OF DISTRIBUTION OF PRACTICE. *J. exp. Psychol.*, May 1959, 57(5), 310-316. (University of Hawaii, Honolulu, Hawaii).

To compare the growth of a pursuit tracking skill under massed versus distributed practice, two groups of subjects had six sessions of eighteen 30-second trials per session. One group (22) had 1.5 minute intervals (distributed) between trials, the other (19) had two seconds (massed); but both groups had 1.5 minute intervals for the sixth session. Then both groups had four test trials. The performance of the two groups on the test trials was compared by the Mann-Whitney signed ranks test. An index of skill level and work decrement were computed for each group and curves fitted to these data. The results are interpreted in terms of several relevant views. G. R 10

13,023

Griew, S. SET TO RESPOND AND THE EFFECT OF INTERRUPTING SIGNALS UPON TRACKING PERFORMANCE. *J. exp. Psychol.*, May 1959, 57(5), 333-337. (University of Bristol, England).

To compare pursuit tracking performance with and without a simultaneous auditory task (pressing key when auditory signal occurred), 20 subjects performed under five experimental conditions of tracking alone, auditory task alone and the two in combination at different rates. Mean timing and mean amplitude error scores for tracking were compared, as well as auditory reaction times. The results were explained in terms of interference and set to respond. The second part of the study compared tracking with and without instructions to expect the auditory signals, though none were presented, as a further examination of the set to respond explanation. T. G. R 9

13,024

Rhule, W. & Smith, K. U. EFFECTS OF INVERSION OF THE VISUAL FIELD ON HUMAN MOTIONS. *J. exp. Psychol.*, May 1959, 57(5), 338-343. (University of Wisconsin, Madison, Wisc.).

To study the effects of four perceptual conditions ranging from normal vision and kinesthetic feedback to inverted vision and kinesthetic feedback on the travel and manipulative movements of handwriting in handwriting tasks of three levels of complexity, four groups of six subjects wrote patterns of three symbols (levels of complexity) in various sequences for ten sessions. Analyses of

variance were made of first and last session performance for each symbol and both types of movement. Also, Duncan Range tests were computed for performance differences at three difficulty levels for four perceptual conditions. Results were interpreted in terms of the theory of space-structured motion. G. I. R 14

13,025

Von Fieandt, K. & Gibson, J. J. THE SENSITIVITY OF THE EYE TO TWO KINDS OF CONTINUOUS TRANSFORMATION OF A SHADOW-PATTERN. *J. exp. Psychol.*, May 1959, 57(5), 344-347. (University of Helsinki, Norway & Cornell University, Ithaca, N. Y.).

To compare the perceptions induced by two kinds of continuous transformation and determine whether corresponding impressions of rigid and non-rigid motion would occur spontaneously, 20 observers viewed the shadow of a net undergoing the two classes of motion and described these movements. For the second and third parts, they used the names developed in part one (spontaneous terms) to identify these movements presented with and without intertrial intervals. The findings were discussed in terms of Poincaré's question about the eye's ability to distinguish between change of position and change of state. I. R 5

13,026

Morant, R. B. THE VISUAL PERCEPTION OF THE MEDIAN PLANE AS INFLUENCED BY LABYRINTHIAN STIMULATION. *J. Psychol.*, Jan. 1959, 47(First Half), 25-35. (Brandeis University, Waltham, Mass.).

To study the influence of labyrinthian stimulation on visual perception of the median plane, 18 subjects were asked to adjust a luminescent gold spot to apparent median plane while sitting in a rotating chair which subjected each to acceleratory or deceleratory rotation around his vertical axis. All testing was done in the dark. Subjects were retested after a lapse of at least one day. Results were evaluated by analysis of variance and t-tests. Findings are discussed in terms of a retinal displacement theory of space perception and in terms of a sensory tonic theory as these can account for the phenomena. R 22

13,027

Kunnapas, T. M. THE VERTICAL-HORIZONTAL ILLUSION IN ARTIFICIAL VISUAL FIELDS. *J. Psychol.*, Jan. 1959, 47(First Half), 41-48. (University of Stockholm, Sweden).

To investigate quantitatively how artificial visual fields with different ratios of vertical axis to the horizontal (V/H) influence the size of overestimation of the vertical line (OV), and test the hypothesis that the shape of the visual field is one of the

factors influencing subjective estimation of vertical direction, spectacles producing artificial visual fields were worn by 16 subjects, each of whom made 96 adjustments (to a point at which length of a vertical line appears subjectively equal to the horizontal line) under each of six conditions. Differences in over or underestimation under the various conditions are tested for significance. Results are discussed as they relate to the general hypothesis. T. G. I. R 7

13, 028

Mayzner, M. S. & Tresselt, M. E. SHIFTS IN CONNOTATIVE MEANING OF WORDS AS A FUNCTION OF VARYING AMOUNTS OF PREVIOUS RESTRICTIVE EXPERIENCE. *J. Psychol.*, Jan. 1959, 47(First Half), 107-116. (Bell Telephone Laboratories, Inc., N. J. & New York University, New York, N. Y.).

To discover the optimum number of discrete stimuli needed to produce the greatest anchoring effect for a series of word-concept scales, 100 subjects were given a list of 600 words and asked to check each as belonging to none, or one of six concepts. Profiles were obtained which showed frequency with which each word was judged as belonging to a given concept. From these data anchoring concepts were selected and word lists prepared in which the number of anchoring stimuli was varied systematically from zero to 30 per conceptual category and administered to 450 new subjects. Analysis of variance was performed for each conceptual category. T. G. I. R 5

13, 029

Mayzner, M. S. & Tresselt, M. E. ANAGRAM SOLUTION TIMES: A FUNCTION OF TRANSITION PROBABILITIES. *J. Psychol.*, Jan. 1959, 47(First Half), 117-125. (Bell Telephone Laboratories, Inc., N. J. & New York University, New York, N. Y.).

To study the effect of different transition probabilities (digram frequency associated with each letter pair) 40 subjects, randomly assigned to one of two major conditions (the same 20 words presented as anagrams having (1) low transition totals, or (2) high transition totals, hard letter order of aining under both conditions), were asked to solve the 20 anagrams verbally. The Mann-Whitney U test was employed to evaluate effect of the transition probability variable. Results are discussed as they relate to relative looseness of the patterned letter group; hard or easy letter order; methodological considerations, and so forth. T. R 11

13, 030

Donaldson, J., Magnuson, K., McHugh, L., Niner, R., et al. PSYCHOLOGICAL ASPECTS OF CONFINEMENT IN

FALLOUT SHELTERS. *J. Psychol.*, April 1959, 47(Second Half), 163-170. (Johns Hopkins University, Baltimore, Md.).

The psychological problems which might arise in large public fallout shelters occupied over an extended period of time by a heterogeneous group are discussed under the headings - traumatic (immediately after the disaster) and post traumatic (after the initial shock wanes). Measures (taken before any attack) to help alleviate these problems are suggested. R 3

13, 031

Jones, F. P., Gray, Florence E., Hanson, J. A., & O'Connell, D. N. AN EXPERIMENTAL STUDY OF THE EFFECT OF HEAD BALANCE ON PATTERNS OF POSTURE AND MOVEMENT IN MAN. *J. Psychol.*, April 1959, 47(Second Half), 247-258. (Tufts University, Medford, Mass.).

To study change in postural pattern following change in distribution of tonus, six normal adults were trained to recognize and inhibit tensional responses that disturb head balance. Single and multiple-image photography was employed to record these patterns, t-tests were performed on the data and the findings were discussed in terms of anti-gravity reflexes and resultant patterns of movement. T. G. I. R 9

13, 032

Comalli, P. E., Jr., Wapner, S. & Werner, H. PERCEPTION OF VERTICALITY IN MIDDLE AND OLD AGE. *J. Psychol.*, April 1959, 47(Second Half), 259-266. (Clark University, Worcester, Mass.).

To study changes in spatial organization - the perception of verticality - in old age and compare it to that in younger ages, 75 men between 20 and 80 years adjusted a luminescent rod to the vertical under each of 12 conditions which included different body positions in combination with different starting positions of the rod. Deviation from vertical in degrees for each condition was analyzed as a function of age by analysis of variance. The findings are discussed in terms of the orthogenetic principle. T. G. R 4

13, 033

Bartley, S. H. & Adair, H. J. COMPARISONS OF PHENOMENAL DISTANCE IN PHOTOGRAPHS OF VARIOUS SIZES. *J. Psychol.*, April 1959, 47(Second Half), 289-295. (Michigan State University, East Lansing, Mich.).

Actual viewing distance necessary to obtain a judgment of equal distance for different sizes of photographic prints was determined psychophysically for 15 subjects using several print sizes and viewing distances. An analysis of variance was performed on the data and the findings discussed in terms of the laws of visual angle and constancy. G. I. R 5

13,034

Kunnapas, T. M. VISUAL FIELD AND SUBJECTIVE CENTER OF A DIAMOND. *J. Psychol.*, April 1959, 47(Second Half), 305-316. (University of Stockholm, Sweden).

To investigate whether and to what extent the shape of the monocular visual field influences the interocular differences both for horizontal and vertical diagonal distances, ten subjects bisected these distances by fixing the center point of a diamond under each of four experimental conditions (natural visual field--right eye, left eye; artificially limited visual field--right eye, left eye). Average differences between right and left halves when they appeared equal subjectively were compared graphically and statistically by *t* tests for the various conditions. The findings are discussed in terms of the four predicted effects. T. G. I. R 16

13,035

Roehrig, W. C. THE INFLUENCE OF AREA ON THE CRITICAL FLICKER-FUSION THRESHOLD. *J. Psychol.*, April 1959, 47(Second Half), 317-330. (The Psychiatric Institute, N. Y.).

To investigate effect of area on critical flicker fusion (cff) thresholds using foveally-fixed testpatches (from 3.4 to 49.6 degrees diameter in six steps), three practiced observers judged the point of flicker for each size at seven frequencies (35 to 85 cycles/second). Also to determine maximum cff when area and intensity of test patch were as great as apparatus would permit, five observers made judgments for the 49.6 degree testpatch. The results were discussed in terms of the Granit-Harper law and the Ferry-Porter law and related to previous findings. T. G.

13,036

Ekman, G. WEBER'S LAW AND RELATED FUNCTIONS. *J. Psychol.*, April 1959, 47(Second Half), 343-352. (University of Stockholm, Sweden).

This paper investigates in some more detail the relation between subjective magnitude (R) and the subjective correlate (ΔR) of a just noticeable stimulus difference in four continua, and, on this basis, derives an adequate form for Weber's law and tests it by fitting some experimental data to the function. Also, possible relations between differential and absolute sensitivity are discussed. G. R 18

13,037

Royer, F. L. THE FORMATION OF CONCEPTS WITH NON-VERBAL AUDITORY STIMULI. *Amer. J. Psychol.*, March 1959, LXXII(1), 17-31. (Veterans Administration Hospital, Perry Point, Md.).

The purposes of two experiments were (1) to compare the learning of concepts based on a prominent partial in a complex tone

with learning based on harmonic structure of a complex tone; and (2) to determine effect of prior experience and stimuli and hierarchical order on concept formation. Both experiments used the method of anticipation. In the first, six stimuli and six responses were presented to subjects. In the second, 28 subjects were given a comparable task but the stimulus included temporal changes along various dimensions. Analysis of variance was performed on results from both experiments, and results from the two are compared. T. I. R 13

13,038

Heinemann, E. G., Tulving, E. & Nachmias, J. THE EFFECT OF OCULOMOTOR ADJUSTMENTS ON APPARENT SIZE. *Amer. J. Psychol.*, March 1959, LXXII(1), 32-45. (Vassar College, Poughkeepsie, N. Y., University of Toronto, Toronto, Ontario, Canada & Swarthmore College, Swarthmore, Penn.).

Three related experiments are reported bearing on the problem of whether changes in apparent size are: 1) caused by one of the oculomotor adjustments, 2) caused by several of them, or 3) are the optical consequences of these adjustments. Apparatus used in all experiments consisted of an arrangement for presenting in rapid succession two stimulus objects whose size or distance was to be compared. The first experiment dealt with relative apparent size of objects presented at different distances, and relative apparent distance of the same objects. The second experiment tested the effect of eliminating oculomotor adjustments; in the third, all three of the associated oculomotor adjustments occurred together. Results are discussed as they relate to size constancy experiments. T. G. I. R 11

13,039

Story, Anne. FIGURAL AFTER-EFFECTS AS A FUNCTION OF THE PERCEIVED CHARACTERISTICS OF THE INSPECTION-FIGURE. *Amer. J. Psychol.*, March 1959, LXXII(1), 46-56. (USAF Cambridge Research Center, Bedford, Mass.).

To test the hypothesis that set operates, and that figural after-effects (FAE's) differ according to the way subject (S) perceives the inspection-figure (I-figure) 380 S's were divided into seven groups, five of which were controls. I-figure was an ambiguous B-13 presented to group one as a "B" and to group two as "13". It was postulated that greater FAE's should result from inspection of the figure presented as "B". FAE's for the two groups are compared and discussed in terms of the hypothesis. A second experiment tested the hypothesis that kinesthetic after-effects would be greater for S's set to perceive inspection object as open instead of closed. T. I. R 3

13, 040

13, 040

Jenkin, N. & Hyman, R. ATTITUDE AND DISTANCE-ESTIMATION AS VARIABLES IN SIZE-MATCHING. *Amer. J. Psychol.*, March 1959, LXXII(1), 68-76. (Harvard University, Cambridge, Mass.).

To obtain evidence on the general question whether subjects (Ss) who overestimate projected size of a standard under the "analytic" attitude (depth cue available, but S instructed to compare areas of space projected at a given distance by two stimulus objects) would do likewise under the objective attitude (cue available), 77 subjects were individually tested in a one-hour session and made judgments under both instructions. Differences in size-distance judgments (scores) were intercorrelated and factors extracted by the centroid procedure. Relationships between estimated distance and size matches were tested for significance. Results are discussed as they relate to a general "tendency toward constancy," and compared with those obtained by other investigators. T. R. 11

13, 041

Griew, S. COMPLEXITY OF RESPONSE AND TIME OF INITIATING RESPONSES IN RELATION TO AGE. *Amer. J. Psychol.*, March 1959, LXXII(1), 83-88. (University of Bristol, England).

To investigate the effect of complexity of response on response time as this related to age, twelve subjects 20-26 years old, and twelve subjects 50-57 years of age were given a simple perceptual-motor task involving the element of choice. Effects of increased complexity of response on performance in both continuous and discontinuous performance were compared for older and younger subjects. Analysis of variance was used and differences tested for significance. Some possible explanations of obtained results are discussed. T. G. I. R. 4

13, 042

Shackel, B. SKIN-DRILLING: A METHOD OF DIMINISHING GALVANIC SKIN-POTENTIALS. *Amer. J. Psychol.*, March 1959, LXXII(1), 114-121. (Psychological Research Lab., Feltham, England).

Various methods which were tried in order to convert the skin into an inert, "noise-free" conducting medium were described, and results obtained from the method which was deemed best were presented in graphs and tables. The value of this technique to the field of electro-oculography was discussed. T. G. R. 7

13, 043

Turner, R.H. NEW USES FOR THE OSCILLOSCOPE AS AN INSTRUMENT OF RESEARCH AND DEMONSTRATION. *Amer. J. Psychol.*, March 1959, LXXII(1), 122-124. (Oberlin College, Oberlin, Ohio).

Thirteen phenomena which may be readily demonstrated with the oscilloscope were listed and briefly discussed. It was suggested that this approach might be used by small laboratories to replace more expensive specialized equipment.

13, 044

Eason, R.G. & White, Carroll T. A PHOTOELECTRIC METHOD FOR INTEGRATING MUSCLE-ACTION POTENTIALS. *Amer. J. Psychol.*, March 1959, LXXII(1), 125-126. (USN Electronics Lab., San Diego, Calif.).

The principle basic to the method described in this note consisted of passing light through a given segment of the ink-tracing and measuring with a sensitive photometer the amount of blockage caused by the tracing. The procedure was described in detail and some advantages of the method were noted.

13, 045

Thurlow, W. & Tabory, L. EFFECTS OF REPEATED PRESENTATIONS OF A TONE UPON ABSOLUTE LOUDNESS JUDGMENTS. *J. gen. Psychol.*, April 1959, 60(Second Half), 161-166. (University of Wisconsin, Madison, Wisc.).

To determine: a) whether repeated judgments of a soft tone will change one's frame of reference so this tone will eventually sound louder and b) whether repeated judgments of a loud tone will cause it eventually to sound weaker, 70 subjects rated the loudness of a 1000 cycles per second tone, repeated 100 times, on an "absolute scale." A different sensation level (10, 30, 50, 70 or 90 decibels) of the tone was used for each experimental group. Friedman's rank test was applied to average ratings for blocks of ten trials for each condition. The results are discussed in terms of Helson's Adaptation Level Theory and other relevant concepts. G. R. 5

13, 046

Tabory, L. & Thurlow, W. JUDGMENTS OF THE LOUDNESS OF A SERIES OF TONES WITH TWO DIFFERENT RANGE EXPECTANCIES. *J. gen. Psychol.*, April 1959, 60(Second Half), 167-172. (University of Wisconsin, Madison, Wisc.).

To determine how the end stimuli of a series of tones affect judgments of the loudness of the series, two groups of subjects (12 in each - all had a minimum of two years training in music) rated, on a numerical scale by the method of Single Stimuli, a 1000 cycles/second tone which ranged in six steps either from 30 to 50 decibels (group 1) or from 70 to 90 decibels (group 2). A set of judgments (50 of each stimulus) was made for each of two expectancies: 1) that range of tones would be as they were demonstrated, 2) that range may be as demonstrated, larger

or smaller. Mean ratings as a function of intensity for two expectancies and ratings for end stimuli were analyzed by Wilcoxon signed rank test. T. G. R 5

13,047

Ryan, T. A. MULTIPLE COMPARISONS IN PSYCHOLOGICAL RESEARCH. Psychol. Bull., Jan. 1959, 56(1), 26-47. (Cornell University, Ithaca, N.Y.).

Methods such as the F test only permit rejection of the over-all null-hypothesis, that all the means are equal, but do not provide a procedure for comparing specific means with each other. Several basic issues involved in multiple comparisons are discussed - a priori versus a posteriori comparisons, concept of error-rate, nonindependence of comparisons, and so forth - and five specific methods for multiple comparisons of means are discussed.

13,048

Oyama, T. A NEW PSYCHOPHYSICAL METHOD: METHOD OF TRANSPOSITION OR EQUAL-APPEARING RELATIONS. Psychol. Bull., Jan. 1959, 56(1), 74-79. (Hokkaido University, Japan).

Questioning whether in using the method of adjustment the amount of illusion (as in the Muller-Lyer) can be measured without destroying or altering the stimulus pattern, the author describes a method which leaves the original stimuli intact while the apparent relation between the stimulus parts is measured. Results obtained with both the old and the new method are compared, using the Muller-Lyer illusion, figural after-effects, and the size-constancy experiment. Theoretical considerations, such as proper classification of the new method, are discussed. G. I. R 14

13,049

Plutchik, R. THE EFFECTS OF HIGH INTENSITY INTERMITTENT SOUND ON PERFORMANCE, FEELING, AND PHYSIOLOGY. Psychol. Bull., March 1959, 56(2), 133-151. (Hofstra University, Hempstead, N.Y.).

This paper reviews studies published since 1950. Three hypotheses are advanced relating to research on the effect of noise on various kinds of performance. The effects of sound on feeling are discussed in terms of fatigue effects and the characteristic repetitive sounds in terms of subjective reports. Studies of the physiological effects of repetitive sounds and of loud sounds are also reviewed. R 80

13,050

Buchwald, A. M. DATA DISTORTIONS DUE TO INHERENT DIFFERENTIAL SAMPLING. Psychol. Bull., May 1959, 56(3), 224-227. (Indiana University, Bloomington, Ind.).

The term "inherent differential sampling" is defined and illustrations of kinds of distortions it produces are given. Ways of overcoming such distortions are described. R 4

13,051

Clarke, N. P., Bondurant, S. & Leverett, S. D. HUMAN TOLERANCE TO PROLONGED FORWARD AND BACKWARD ACCELERATION. J. Aviat. Med., Jan. 1959, 30(1), 1-21. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

This report stresses the need for further study of man's tolerance for acceleration due to the imminence of manned space flight and extends previous observations by defining optimal body positions for both forward and backward acceleration. Using a rate of onset of 0.5 g per second, plateaus between two and 12 g were maintained, with subjects optimally positioned, until subjective loss of a critical faculty occurred. Tolerance limits were defined and spatial vectocardiography, respiratory rate and changes in functional residual capacity and pulmonary compliance were observed. T. G. I. R 30

13,052

Bergin, K. G. MEDICAL ASPECTS OF CIVIL JET AIR TRANSPORT OPERATIONS. J. Aviat. Med., Jan. 1959, 30(1), 22-28. (British Overseas Airways Corporation, London Airport, London, England).

This paper discusses some of the medical aspects of civilian jet air transport operations. The characteristics of the good pilot are mentioned first and then some of the consequences of decompression at altitude. Oxygen requirements in normal flight and in emergency are discussed generally and then related to Comet aircraft equipment. Finally, brief consideration is given to such special matters as glare and radiation hazard. G.

13,053

Phillips, P. B. & Zariello, J. J. EPILEPTIFORM SEIZURE AND LOW G TOLERANCE. J. Aviat. Med., Jan. 1959, 30(1), 35-37. (USN School of Aviation Medicine, Naval Air Station, Fla.).

This is a report of a case in which epileptiform seizure and low tolerance to acceleration were found to be associated. The case is described and it is suggested that convulsive seizures of any type should be picked up early in flight training. T. R 1

13,054

Bending, G. C. SPATIAL DISORIENTATION IN JET AIRCREWS. J. Aviat. Med., Feb. 1959, 30(2), 107-112. (Royal Canadian Air Force Station, Comox, British Columbia, Canada).

This report describes the physiology of spatial disorientation, discusses several

instances of this that have occurred with jet aircrews, indicates methods of preventing or alleviating the serious effects of such disorientation, and considers the management of such problems. R 5

13, 055

Zeller, A. F. HUMAN ABILITY AND HIGH PERFORMANCE FLIGHT. *J. Aviat. Med.*, Feb. 1959, 30(2), 126-135. (Directorate of Flight Safety Research, Norton AFB, Calif.).

To assess human ability for high performance flight, this paper analyzes accidents which have occurred with the 100 series fighter aircraft. The overall accident trend at various levels of pilot experience is given and discussed. Accidents are also analyzed by phase of operation, type of accident, causative factors, and emergency procedures used. T. G.

13, 056

Ward, J. E., Hawkins, W. R. & Stallings, H. PHYSIOLOGIC RESPONSE TO SUBGRAVITY. I. MECHANICS OF NOURISHMENT AND DEGLUTITION OF SOLIDS AND LIQUIDS. *J. Aviat. Med.*, March 1959, 30(3), 151-154. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

To study the mechanics of nourishment during weightlessness, 165 sub-gravity parabolas were flown in an F-94C aircraft. Twenty-five subjects attempted to drink from an open container, a container with a pierced lid and plastic straw, and a plastic squeeze bottle. Observations were also made regarding deglutition of solids, including swallowing of both well and poorly masticated pieces of food. I. R 4

13, 057

von Döbeln, W., Engström, C. G. & Ström, G. PHYSICAL WORKING CAPACITY OF SWEDISH AIR FORCE PILOTS. *J. Aviat. Med.*, March 1959, 30(3), 162-166. (Medical Division, Royal Swedish Air Force, Stockholm, Sweden).

The physical working capacity of Swedish Air Force pilots, staff personnel, and pilot applicants was determined as the pulse rate response in steady state to stepwise increased sub-maximal loads on a bicycle ergometer. The groups are compared and such factors as the effects of age discussed. T. G. R 14

13, 058

Hall, F. G. & Salzano, J. MAXIMAL INSPIRATORY AND EXPIRATORY STROKE VOLUMES IN HUMAN SUBJECTS AS RELATED TO BODY POSTURE. *J. Aviat. Med.*, March 1959, 30(3), 167-172. (Duke University, Durham, N. C.).

In this experiment, timed maximal expiratory and inspiratory stroke volumes were measured as a function of posture.

Subjects were 18 normal young men ranging in age from nineteen to thirty years. During the tests, the subjects were placed in four postures; standing, supine, head up, and body axis at 45 degrees from horizontal, and head down and body axis at 45 degrees from horizontal. Percentage of maximal stroke volume was related to posture. T. G. I. R 3

13, 059

Sarnoff, C. A. & Haberer, C. Elizabeth. THE TECHNIQUE OF STUDYING DISTURBANCES OF CONSCIOUSNESS AT ALTITUDE. *J. Aviat. Med.*, April 1959, 30(4), 231-240.

A technique for planning and objective monitoring of diagnostic altitude chamber flights and for setting up the electronic monitoring devices is presented in this paper. The method is felt to be useful for studying the factors involved in the etiology of disturbances of consciousness occurring under conditions of decreased barometric pressure. Three cases are reported to illustrate the usefulness and versatility of the technique. G. R 5

13, 060

Gell, C. F., Hays, E. L. & Correale, J. V. DEVELOPMENTAL HISTORY OF THE AVIATOR'S FULL PRESSURE SUIT IN THE U. S. NAVY. *J. Aviat. Med.*, April 1959, 30(4), 241-250.

This paper presents a history of the development by the U. S. Navy of aviators' full pressure suits. There is a description of the full pressure suit system, followed by a section which outlines developments and changes in design from 1935 to the present. Finally, brief mention is made of a number of physiological studies which have been made in connection with pressure suits. G. I. R 2

13, 061

Rosenbaum, D. A. EXPLOSIVE DECOMPRESSION STUDIES WITH ANIMALS WEARING FULL BLADDER SUIT AND HELMET. *J. Aviat. Med.*, April 1959, 30(4), 251-257.

This paper describes explosive decompression studies made with animal subjects outfitted with full bladder suits and helmets. Seventeen dogs were divided into three groups. Group I was decompressed from 8,000 to 65,000 feet (ft.) in 28 milliseconds (ms.) after which the animals were autopsied or followed clinically. Group II was decompressed from ground level to 70,000 ft. in 30 ms. and Group III from 8,000 to 65,000 ft. to measure suit bladder and mask pressures. Pathological and clinical results are discussed. T. G. I. R 13

13, 062

Berry, C. A. & King, A. H. USE OF ALTITUDE CHAMBER IN THE DIAGNOSIS

AND DISPOSITION OF PROBLEM AERO-MEDICAL CASES. *J. Aviat. Med.*, April 1959, 30(4), 258-267.

The use of the altitude chamber as a diagnostic aid in aeromedical cases is discussed in this paper. Illustrated with case histories, the chamber's use is described for ear, nose, and throat problems, cardiac and pulmonary conditions, hypoxia, hyper-ventilation, and head injuries. G. R 8

13, 063

Robbins, J.H., Kratochvil, C.H., Ellis, J.P. & Howell, T. R. STUDIES OF HYPOGLYCEMIA IN FLIGHT. *J. Aviat. Med.*, April 1959, 30(4), 268-272.

To study hypoglycemia (faulty glucose metabolism) in relation to flight safety, pre-flight and post-flight blood sugar determinations were performed on 144 U. S. A. F. jet aircraft crew members. In addition, 112 modified oral glucose tolerance tests were done. The data are presented and evidence for episodes of hypoglycemia sought.

T. G. R 10

13, 064

Webb, P. CLOSED BREATHING-VENTILATING SYSTEMS USING RECIRCULATED OXYGEN. *J. Aviat. Med.*, April 1959, 30(4), 273-279.

The possibilities of employing closed breathing-ventilating systems using recirculated oxygen for prolonged flight beyond the atmosphere are explored in this study. The functional requirements for such an apparatus are defined and a laboratory system to test the approach was developed and used. Laboratory results are described briefly and future work is outlined. G. I.

13, 065

Michel, E.L. & Sharma, H.S. DETERMINATION OF EFFECTIVE DEAD AIR SPACE OF AVIATORS' RESPIRATORY EQUIPMENT BY PHYSIOLOGIC MEASUREMENT. *J. Aviat. Med.*, April 1959, 30(4), 280-286.

This paper describes a method which permits measurement of the resultant dead air space effect produced by dead space inherent in breathing equipment. The method, which maintains constant both breathing frequency and end tidal CO₂ concentration, measures the increase in respiratory tidal volume resulting from the effect of equipment dead space. Such measurements are considered to be important for determining the physiological limitations of the equipment and as a criterion for improving the design of future breathing apparatus. T. G. I. R 7

13, 066

Simons, D.G. THE "MANHIGH" SEALED CABIN ATMOSPHERE. *J. Aviat. Med.*, May 1959, 30(5), 314-325. (USAF

Aeromedical Field Lab., Holloman AFB, N. M.).

This paper discusses some of the factors involved in the selection of a sealed cabin atmosphere and illustrates its arguments with discussion of the Manhigh program. The atmosphere of the Manhigh capsule is described in three sections: the effect of certain design parameters on choice of atmosphere, characteristics of the atmosphere (total pressure, oxygen concentration, and inert gas), and the flight experience and measurements made during flight.

T. G. R 10

13, 067

Ross, M.D. REACTIONS OF A BALLOON CREW IN A CONTROLLED ENVIRONMENT. *J. Aviat. Med.*, May 1959, 30(5), 326-333. (ONR, Washington, D. C.).

This is a discussion of the results of two representative flight simulation tests and two actual flights of a two-man balloon crew in a spherical sealed cabin gondola with a controlled atmosphere. The reactions of the crew members, as well as such measurements as air pressure, air temperature, relative humidity, and oxygen content at successive altitudes, are given and discussed. Implications for space flight are also mentioned. T. R 19

13, 068

Schaefer, K.E. EXPERIENCES WITH SUBMARINE ATMOSPHERES. *J. Aviat. Med.*, May 1959, 30(5), 350-359. (USN Medical Research Lab., Conn.).

This paper reviews the problems experienced during prolonged submarine submerge periods. Thermal exchange in a normal apartment and a submarine are compared. The role of trace substances and ionization patterns of the atmosphere in confined spaces is discussed. Carbon dioxide toxicity is considered and differences in the combined effects of increased CO₂ and lowered oxygen under acute and chronic conditions are analyzed. G. I. R 18

13, 069

Miller, H., Riley, M.B., Bondurant, S. & Hiett, E.P. THE DURATION OF TOLERANCE TO POSITIVE ACCELERATION. *J. Aviat. Med.*, May 1959, 30(5), 360-366. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

Human tolerance to prolonged positive accelerations of sub-blackout magnitude were studied in 11 subjects who made a total of 73 runs on the human centrifuge at g levels of 3.0, 3.5, 4.0, 4.5, 5.0, and 6.0. A gradual rate of onset of acceleration was used (0.07 g per second). The duration of tolerance to g of these levels is discussed, as well as clinical observations of various kinds.

T. R 10

13,070

13,070

Rippen, K.H. MODULAR SPACE PLANNING. *Systems*, March-April 1959, XXIII(2), 6-7. (Kenneth Rippen Co., N.Y.).

An argument for "open space" office layout is presented in this brief paper. Such a layout, using movable partitions, is said to lead to better morale and better provision for change and expansion in the business. 1.

13,072

von Békésy, G. SYNCHRONISM OF NEURAL DISCHARGES AND THEIR DEMULTIPLICATION IN PITCH PERCEPTION ON THE SKIN AND IN HEARING. *J. acoust. Soc. Amer.*, March 1959, 31(3), 338-349. (Harvard University, Cambridge, Mass.).

To investigate the role of volleys in the sensation of "pitch" on the skin, experiments using mechanical and electrical stimulation of the skin were performed and described. Results were discussed as they relate to theoretical expectations, to results obtained in previous experiments, as they relate to auditory pitch perception, to the understanding of problems raised by application of the volley principle, and to the question of why frequencies of neural potential in the cortex are lower than frequency of the stimulus. G. I. R 12

13,073

Scharf, B. CRITICAL BANDS AND THE LOUDNESS OF COMPLEX SOUNDS NEAR THRESHOLD. *J. acoust. Soc. Amer.*, March 1959, 31(3), 365-370. (Northeastern University, Boston, Mass.).

To measure the loudness of faint sounds as a function of band width and level, over 100 different subjects were asked to match in loudness complexes of different band widths to a comparison sound which was either a pure tone of the same frequency as the center of the complex, or a band of white noise. Subjects used a "bracketing" method in approaching the loudness match. Results are discussed in terms of a critical band "which defines limits with which the spreading of energy leaves the loudness of a complex sound unchanged." G. R 13

13,074

Eldred, K. ACOUSTICAL FACTORS IN JET AIRPORT DESIGN. *J. acoust. Soc. Amer.*, May 1959, 31(5), 547-557. (Western Electro-Acoustic Lab., Inc., Los Angeles, Calif.).

This paper "reviews the relationships between the noise resulting from commercial jet and propeller airliner operations, including takeoff, taxi, and idle, for various projected traffic densities and various airport building functional design criteria. Presently used criteria are explained and new criteria are suggested to fill a gap in the over-all evaluation procedure for short time noises. Methods and examples are presented which

expedite initial visualization of the major acoustical factors in an airport design situation, facilitate decisions for preliminary airport building layout, and enable evaluation of possible wall and roof structures."

T. G. I. R 21

13,075

Ward, W.D., Glorig, A. & Sklar, Diane L. RELATION BETWEEN RECOVERY FROM TEMPORARY THRESHOLD SHIFT AND DURATION OF EXPOSURE. *J. acoust. Soc. Amer.*, May 1959, 31(5), 600-602. (Research Center, Subcommittee on Noise, Los Angeles, Calif.).

To determine whether the manner in which a temporary threshold shift (TTS) is produced is irrelevant to the recovery process, i.e. "if two recovery curves coincide at any point in time they will agree at all points," three groups of five listeners each were exposed to (1) 106 decibel (db) Sound Pressure Level (SPL) for 12 minutes, (2) 98 db for 27 minutes, or (3) 90 db for 117 minutes. One week intervened between successive tests, and order of presentation was balanced so each experimental condition was presented first to one group, second to another, and so forth. Apparatus and procedures were described in earlier articles. Results were discussed in terms of hypotheses presented in the literature, and of generalizability of the findings. G. R 8

13,076

Garner, W.R. ON THE LAMBDA LOUDNESS FUNCTION, MASKING AND THE LOUDNESS OF MULTICOMPONENT TONES. *J. acoust. Soc. Amer.*, May 1959, 31(5), 602-607. (Johns Hopkins University, Baltimore, Md.).

The loudness data of Fletcher and Munson for multicomponent tones were predicted, using the lambda loudness function and two basic assumptions: (1) loudness of components add as the sum of their squares, and (2) the effect of masking is to subtract a constant amount of loudness. The usefulness of the lambda function as compared with other loudness functions for integration of auditory data was discussed. G. R 9

13,077

Gulliksen, H. MATHEMATICAL SOLUTIONS FOR PSYCHOLOGICAL PROBLEMS. *Amer. Scientist*, June 1959, 47(2), 178-201.

This paper attempts to show the value of the mathematico-deductive approach to various psychological problems, and in particular to indicate the very general applicability of two techniques: 1) the usefulness of matrix algebra for expressing a large number of psychological theories and for comparing the theory (observation equations) with data, and 2) the generality of multidimensional scaling as an approach to a variety of psychological problems. T. G. I. R 21

13,078

Brown, J. L. THE BIO-DYNAMICS OF LAUNCH AND REENTRY. *Naval Res. Rev.*, May 1959, 8-15. (University of Pennsylvania, Philadelphia, Penn.).

This paper, in consideration of the stresses to which man will be subjected upon leaving and returning to earth, reviews recent work on tolerance of acceleration, performance under conditions of acceleration, and design of control mechanisms and pilot restraint equipment. G. 1.

13,079

Kogan, N., Tagiuri, R. & Portis, B., Jr. PERCEPTION OF RECIPROCITY AND THE GROUPING PRINCIPLE. *J. soc. Psycho.*, Feb. 1959, 49(First Half), 27-32. (Harvard University, Cambridge, Mass.).

To test whether reciprocal orientation may constitute a basis for perceptual unit formation, 48 subjects were shown slides on which groups of dots were "paired" by reciprocally oriented lines; slides were removed and subjects asked to reproduce the lines in test booklets containing dot-patterns (without the lines). Results are discussed as they relate to the perceptual principle of good continuation and as they may relate to high visibility of mutual interpersonal choices. T. 1. R. 3

13,080

Holland, J. G. COUNTING BY HUMANS ON A FIXED-RATIO SCHEDULES OF REINFORCEMENT. *J. exp. Anal. Behav.*, April 1958, 1(2), 179-181. (Harvard University, Cambridge, Mass.).

The task was to detect deflection of a meter-needle on a face which subject was required to light in order to detect the signal. The problem was one of possible explanations for changes in over-all response rate when subjects counted verbally the number of times they lighted the light. To test whether this might impose pacing, hence affect rate, two subjects were instructed that they could obtain shorter latencies by counting. Results are compared with those of a subject who began counting his responses spontaneously, and all are related to the problem of differences in results which might be due to variables beyond control of the experimenter. G. R. 3

13,081

Azrin, N. H. SOME EFFECTS OF NOISE ON HUMAN BEHAVIOR. *J. exp. Anal. Behav.*, April 1958, 1(2), 183-200. (Anna State Hospital, Anna, Ill.).

To differentiate the effects of the stimulus, noise, in terms of its use as a discriminative stimulus or as response-contingent stimulus, the effects of noise were studied (1) when the presence or absence of noise had fixed temporal relationships to neither the responses nor the

reinforcement, (2) to reinforcement; and (3) to responses, 80 subjects participated approximately six hours a day for one to three days. The task was to detect deflection of a meter-needle on a face which subject was required to light in order to detect the signal. Subject was in a closed sound attenuating room. Noise was delivered through two enclosed speaker systems. Results are discussed in terms of modification in performance which accompanied noise under each of the three conditions. G. R. 29

13,082

Pollack, I. & Johnson, L. B. REPRODUCTION AND IDENTIFICATION OF ELEMENTS OF AUDITORY DISPLAYS. *J. acoust. Soc. Amer.*, Jan. 1959, 31(1), 7-8. (USAF Cambridge Research Center, Bolling AFB, Washington, D. C.).

The ability to identify the frequency of tones was examined under four training procedures: 1) control (no information provided), 2) information (informed of correct tone), 3) production (produced tone on oscillator and then informed of correct tone), 4) reproduction (duplicated tone by whistling and then informed of correct tone), the aim being to improve such identifications. For each procedure, 16 listeners identified one out of a set of 12 different possible tones (932-1760 cycles/second) by assigning a number to it - experimental series. All four groups of listeners then identified tones with no information provided - control series. The results were analyzed by nonparametric statistical tests and their implications for the operational situation are indicated. G. R. 5

13,083

Zwislocki, J., Pirodda, E. & Rubin, H. ON SOME POSTSTIMULATORY EFFECTS AT THE THRESHOLD OF AUDIBILITY. *J. acoust. Soc. Amer.*, Jan. 1959, 31(1), 9-14. (Syracuse University, Syracuse, N. Y.).

To determine the nature of the post-stimulatory shifts at the threshold of audibility as a function of duration of test stimulus (10-50 milliseconds), duration of prime stimulus (5-1000 milliseconds), sensation level of prime stimulus (15-85 decibels) and interval between prime and test stimulus (20-about 700 milliseconds), listeners responded to the second of a pair of 1000 cycles/second tones by a modification of Bekesy's tracking method. Also, the effects of gradual as well as abrupt cutoffs of the prime stimulus were determined. The results are discussed in terms of other relevant findings, with some mention of underlying neural activity. G. R. 15

13,084

Pollack, I. & Pickett, J. M. INTELLIGIBILITY OF PEAK-CLIPPED SPEECH AT HIGH NOISE LEVELS. *J. acoust. Soc.*

Amer., Jan. 1959, 31(1), 14-16. (USAF Operational Applications Lab., Bolling AFB, Washington, D. C.).

To determine whether peak-clipping of speech improves speech intelligibility in high-level noise environments, symmetrical peak-clipped (0, 12 and 24 decibels) power-compensated speech signals mixed electrically with noise (uniform and low frequency from 250-6800 cycles at both 90 and 125 decibels) for a range of speech-to-noise ratios were presented to five listeners over matched binaural earphones. The test materials were the Harvard PB monosyllabic word tests; the check-list method was employed. Intelligibility scores were presented as a function of the aforementioned variables and a statistical analysis of the test variance of these scores was performed. G. I. R 8

13,085

Sherrick, C. E. EFFECT OF BACKGROUND NOISE ON THE AUDITORY INTENSIVE DIFFERENCE LIMEN. *J. acoust. Soc. Amer.*, Feb. 1959, 31(2), 239-242. (Washington University, St. Louis, Mo.).

To study the effect of random background noise (signal-to-noise ratios of -15, -10, 0 and 10 decibels and quiet) on the difference limen (DL) for pure tones which were varied in frequency (250, 1000, and 4000 cycles/second) and sensation level (20, 40 and 60 decibels), three trained listeners judged when the tone was modulated under all combinations (45) of the above conditions at each of three separate sessions. In addition, the DL of a 1000 cycle/second tone at 10, 30, 50 and 70 decibels for signal-to-noise ratios of -10, 0, 10 and 20 decibels was studied using a loudness matching technique (method of average error). All data were treated by analysis of variance technique. The results are discussed in terms of the simple masking hypothesis. T. G. I. R 9

13,086

Goldfried, M. R. ONE-TAILED TESTS AND "UNEXPECTED" RESULTS. *Psychol. Rev.*, Jan. 1959, 66(1), 79-80. (University of Buffalo, Buffalo, N. Y.).

This is a critical note on the use of one-tailed tests of significance when results in the opposite direction either would be psychologically meaningless or could not be deduced by any psychological theory. Also, three possible courses of action when such results occur are presented with their associated difficulties. R 9

13,087

von Békésy, G. SIMILARITIES BETWEEN HEARING AND SKIN SENSATIONS. *Psychol. Rev.*, Jan. 1959, 66(1), 1-22. (Harvard University, Cambridge, Mass.).

A comparison of hearing and the sensation of vibration along the skin, in which

neurological similarities and differences were pointed out, demonstrates the feasibility of the analogy between these senses for research in hearing, the phenomena of which are not directly observable. The models of the cochlea constructed from various threshold determination studies were utilized for experiments comparing the two senses. Problems of inhibition and summation are discussed and the funneling (law of contrast) of the nervous system demonstrated for both hearing and skin sensations. G. I. R 21

13,088

Luce, R. D. ON THE POSSIBLE PSYCHOPHYSICAL LAWS. *Psychol. Rev.*, March 1959, 66(2), 81-95. (Harvard University, Cambridge, Mass.).

To determine the functional relations between subjective continua and the underlying physical continua, an approach is outlined considering all combinations of ratio, interval and logarithmic interval scales to determine what possible forms such a substantive theory could take. A principle of theory construction is set forth which limits significantly the possible laws relating the two continua, and two circumstances for which these do not hold are discussed. T. R 18

13,089

Staats, A. W. & Staats, Carolyn K. MEANING AND M: CORRELATED BUT SEPARATE. *Psychol. Rev.*, March 1959, 66(2), 136-144. (Arizona State University, Flagstaff, Ariz.).

Two approaches to word meaning were summarized and contrasted: 1) verbal responses made to the word and 2) conditioned mediating response, part of the response elicited by the object denoted by the word. Word meaning was distinguished from a word's verbal associates and the correlation between intensity of meaning and verbal associate measures were reported. These approaches were discussed also in terms of the manner in which words acquire meaning. Conclusions as to semantic generalization are set forth. T. I. R 17

13,090

Mandler, G. STIMULUS VARIABLES AND SUBJECT VARIABLES: A CAUTION. *Psychol. Rev.*, May 1959, 66(3), 145-149. (Harvard University, Cambridge, Mass.).

The need for distinguishing between those variables associated with subjects and those associated with situations or stimuli in two-variable or multi-variable research designs is discussed for two types of problems: individual differences (subject sampling) and situational (stimulus sampling). In order to make meaningful use of the findings from such research the author demonstrates by examples that the population of subjects or stimuli as well as the operational

and conceptual function of the variables must be completely specified. R 7

13,091

Feather, N. T. SUBJECTIVE PROBABILITY AND DECISION UNDER UNCERTAINTY. *Psychol. Rev.*, May 1959, 66(3), 150-164. (University of New England, Australia).

This is a discussion of the manner in which the concept of subjective probability is incorporated into each of five approaches which relate to decision under uncertainty: the Lewin, et al., analysis of level of aspiration behavior, Tolman's principles of performance, Rotter's basic equation in his social learning theory, Edward's subjectively expected utility model in decision theory, and Atkinson's risk-taking model. Two hypotheses are advanced in terms of discrepancies among these approaches and an experimental study outlined to test these. Several implications of this study for decision under uncertainty are considered and discussed. T. R 36

13,092

Taylor, F. V. & Birmingham, H. P. THAT CONFOUNDED SYSTEM PERFORMANCE MEASURE - A DEMONSTRATION. *Psychol. Rev.*, May 1959, 66(3), 178-182. (USN Research Lab., Washington, D. C.).

To demonstrate the inappropriateness of inferring the behavioral properties of any one component, man or machine, from the performance of the total system, an analogue computer study was conducted in which tracking performance of three man-machine systems was compared, using an amplifier in place of the man. For all three systems, the "behavior" of the robot man was made to change in exactly the same way; the performance curves thus obtained are comparable for the "man" component. The findings are analyzed and discussed in terms of their implications for the study of human motor skills. G. I. R 4

13,093

Sharf, D. J. INTELLIGIBILITY OF REITERATED SPEECH. *J. acoust. Soc. Amer.*, April 1959, 31(4), 423-427. (G. and C. Merriam Company, Springfield, Mass.).

To determine the intelligibility of reiterated speech (interrupted speech with repetitions), several trained listeners responded to 18 PB (phonetically balanced) word lists in quiet and in noise with two duty cycles (25 and 50 per cent) with different rates of interruption of the speech signal (0.05 to 3.6 and 24 to 2640 interruptions/second) and with different build-up and delay times (0.1 to 2.5 milliseconds) in the switching operation. Also a few selected conditions were tested with interrupted speech. Analysis of variance was performed

on the data for iterated and interrupted speech for the upper cent duty cycle and several switch rates. The data are interpreted in terms of previous findings and intelligibility functions are presented. T. G. I. R 9

13,094

Lehiste, Ise & Peterson, G. E. VOWEL AMPLITUDE AND PHONEMIC STRESS IN AMERICAN ENGLISH. *J. acoust. Soc. Amer.*, April 1959, 31(4), 428-455. (University of Michigan, Ann Arbor, Mich.).

This paper is primarily concerned with consideration of the parameters which contribute to the judgment of phonemic stress in American English within a framework of physiological effort in which four acoustical parameters predominate: speech power, fundamental voice frequency, phonetic quality and duration. The main emphasis here is the in-effects of amplitude and phonetic quality. Volume indicator and instantaneous amplitude observations on sustained vowels produced under various conditions of speech effort, and on vowels produced in CNC words in a carrier phrase with stress held constant are reported. A theory concerning the perception of linguistic stress, based on judgments of physiological effort involved in producing vowels, is proposed. T. G. I. R 17

13,095

Leatherage, B. H. & Hirsh, Ira J. AUDITORY LOCALIZATION OF CLICKS. *J. acoust. Soc. Amer.*, April 1959, 31(4), 486-492. (Central Institute for the Deaf, St. Louis, Mo.).

To determine the relationship between intensity differences and temporal differences of auditory clicks in the situation where sound is localized in the midline by intensity increases compensating for time differences, four observers at each of three click intensities (40, 60, and 80 decibels) adjusted (10 trials) the interaural temporal difference so the unitary sound image of the click was in the median plane. In a second experiment, five observers made the same series of judgments in the presence of each of four levels of high-frequency masking noise which interfered with reception in the basal turn of the cochlea. These results plus previous physiological observations are the basis for a discussion concerning the underlying peripheral mechanism for auditory localization. T. G. R 19

13,096

Solomon, L. N. SEARCH FOR PHYSICAL CORRELATES TO PSYCHOLOGICAL DIMENSIONS OF SOUNDS. *J. acoust. Soc. Amer.*, April 1959, 31(4), 492-497. (USN Electronics Lab., San Diego, Calif.).

This is an attempt to correlate physical measurements of sounds with their rank orders

13,097

on seven psychological dimensions: magnitude, aesthetic-evaluative, clarity, security, relaxation, familiarity and mood, which were isolated in a previous study by factor analysis. Fifty subjects ranked 20 passive sonar recordings, which had been analyzed for average sound pressure level in each of eight octave bands from 37.5 to 9600 cycles/second, in terms of their aurally perceived characteristics on the seven dimensions. Correlations (ρ) between sound pressure level measurements and rank orders on these seven dimensions were calculated. Also, an analysis of the manner in which 20 sounds clustered within the space defined by the seven dimensions was made. T. G. R. 3

13,097

Pollack, I., Rubenstein, H. & Decker, L. INTELLIGIBILITY OF KNOWN AND UNKNOWN MESSAGE SETS. J. acoust. Soc. Amer., March 1959, 31(3), 273-279. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

To examine the effect of frequency of occurrence of words upon intelligibility in noise for unknown and known message sets, five listeners responded to an unknown 144-word message (monosyllabic English content words, 18 from each frequency class in the Large Magazine Count) and five listeners responded to known eight word messages (composed of aforementioned words) all of which were presented against white noise for a range of signal-to-noise (s/n) ratios (-10 to +15 decibels) which corresponded to several fixed levels of intelligibility (10, 25, 50, 75 and 90 per cent). Also the effect of successive presentations of lists of known and unknown sets without and with correction information was determined. The results are discussed in terms of the adequacy of the PB word lists for intelligibility testing. T. G. R. 13

13,098

Kimura, Toren. THE EFFECT OF LETTER POSITION ON RECOGNITION. Canad. J. Psychol., March 1959, 3(1), 1-10. (McGill University, Ottawa, Canada).

Three experiments were performed to answer these questions: 1) Is response sequence the same over a wide range of stimuli, e.g. when gaps and non-alphabetical material are introduced? 2) What is the effect of reading experience? 3) Do changes in duration of the stimulus affect the way in which letters are reported? Materials consisting of letters and geometric forms were presented tachistoscopically. Subjects (83) of two different educational levels were used. Differences in accuracy in recognition of letters were compared for each of four positions, for varied arrangements of stimuli and as between the two educational levels. Results are related to other experiments in the area. T. I. R. 4

13,099

Baker, G.H. TOWARDS A THEORY OF VIGILANCE. Canad. J. Psychol., March 1959, 13(1), 35-42. (Defense Research Medical Labs., Toronto, Ontario, Canada).

This paper examines and expands the expectancy hypothesis of vigilance proposed by Deese. Illustrations and supporting data are drawn from studies involving (1) rate of signal appearance, (2) inter-signal interval, (3) signal magnitude, (4) knowledge of results, (5) environmental factors, and (6) knowledge of signal locations. G. R. 28

13,100

McCormack, P.D. PERFORMANCE IN A VIGILANCE TASK WITH AND WITHOUT KNOWLEDGE OF RESULTS. Canad. J. Psychol., June 1959, 13(2), 68-71. (Defense Research Medical Laboratories, Toronto, Ontario, Canada).

To investigate performance in a vigilance task with and without knowledge of results, ten paid subjects were required to depress a microswitch each time light was seen through an aperture. Response time was plotted as a function of task duration and length of inter-stimulus interval for both knowledge and no-knowledge conditions. Analysis of variance was performed on the data and results are discussed as they relate to the hypothesis that inhibition is generated at a faster rate under condition of no knowledge than under knowledge. T. G. R. 3

13,101

Corso, J.F. AGE AND SEX DIFFERENCES IN PURE-TONE THRESHOLDS. J. acoust. Soc. Amer., April 1959, 31(4), 498-507. (Pennsylvania State University, Philadelphia, Penn.).

To determine normal thresholds of hearing for pure tones for an age-stratified sample, 500 subjects exposed to minimal levels of industrial noise were given detailed otological examination, required to complete a life-history questionnaire, and given audiometric examinations. Results are presented in tabular form by sex, age group, and for each ear for the total group, for a screened group, and for a truncated distribution. Age range was 18-49 years. Curves of presbycusis are presented and compared to those of the American Standards Association (ASA). Differences between curves obtained in this study were compared with those reported by ASA, and related to the proposed revision of present standards of normal hearing. T. G. R. 18

13,102

Smith, A.M., Jr., Bacon, W.E. & Fozard, J.L. INTENSIVE DIFFERENTIAL THRESHOLDS FOR OCTAVE-BAND NOISE.

J. acoust. Soc. Amer., April 1959, 31(4), 508-510. (Lehigh University, Bethlehem, Penn.).

To investigate the effect of four band widths of different center frequencies presented at three sensation levels on size of differential threshold for intensity, 11 untrained and three trained subjects listened to the stimuli monaurally in a sound treated room, and discriminated loudness differences. Effects of center frequency on size of different thresholds for intensity were discussed, and findings were compared with those reported by other investigators.

G. I. R 9

13,103

Swets, J. A. INDICES OF SIGNAL DETECTABILITY OBTAINED WITH VARIOUS PSYCHOPHYSICAL PROCEDURES. J. acoust. Soc. Amer., April 1959, 31(4), 511-515. (Massachusetts Institute of Technology, Cambridge, Mass.).

To test the assumption made by decision theory that a given signal-to-noise ratio should yield a particular value of the index of detectability (d') regardless of the procedure by which the data are collected, two studies were conducted. One, estimates of d' were obtained from the forced-choice method, with different numbers of alternatives; in the other the yes-no method was used. Estimates of d' obtained under the two conditions were compared and theoretical implications of findings discussed.

G. R 7

13,104

Swets, J. A., Shipley, Elizabeth F., McKee, Molly J. & Green, D. M. MULTIPLE OBSERVATIONS OF SIGNALS IN NOISE. J. acoust. Soc. Amer., April 1959, 31(4), 514-521. (Massachusetts Institute of Technology, Cambridge, Mass.).

Two sets of experiments investigating the relationship between gain in detectability resulting from additional observations, and type of signal and noise employed were reported. The first permitted five observations of each signal in noise; the second employed signals whose frequencies were unknown to the observer. Inferences were made about (1) observer's ability to integrate over time, (2) amount of noise generated by the auditory system, (3) nature of the process of frequency analysis, and (4) observer's mode of dealing with uncertainty as to signal frequency. T. G. R 7

13,105

Ward, W. D., Glorig, A. & Sklar, Diane L. TEMPORARY THRESHOLD SHIFT FROM OCTAVE-BAND NOISE: APPLICATIONS TO DAMAGE-RISK CRITERIA. J. acoust. Soc. Amer., April 1959, 31(4), 522-528. (Research Center, Los Angeles, Calif.).

To investigate the effect of specific octave bands of noise on growth and recovery of temporary threshold shifts (TTS) in normal observers, average TTS of 26 ears of 13 men were obtained using apparatus described in a prior study. General equations for octave-band noises were derived and compared with that for broad-band noise. Recovery curves for the two types of noise were compared. Results were discussed as they related to damage-risk criteria for continuous noise and to need for ear protection.

T. G. R 5

13,106

Laycock, F. A SIMPLE VIEWER TO AID IN "READING" EYE-MOVEMENT FILM RECORDS. Percept. Mot. Skills, June 1959, 9(2), p. 98. (University of California, Riverside, Calif.).

This note describes the materials and their dimensions which were used to construct a simple viewer for reading eye-movement records and for tracings of various sorts. The economy, transport and storage of the device are its major features.

R 1

13,107

Loveless, N. E. & Holding, D. H. REACTION TIME AND TRACKING ABILITY. Percept. Mot. Skills, June 1959, 9(2), p. 134. (University of Durham, Durham, England).

To determine the correlation between reaction time and tracking ability, the scores on a pursuit tracking task and three levels of visual reaction time were analyzed by the Spearman rank-order correlation. Eight subjects were used. Practice sessions preceded each test run for both types of tasks.

T.

13,108

Lewis, C. SPACE TRAINER SIMULATES HYPERSONIC ORBIT. Aviation Week, April 1959, 70(16), 56-63.

This article describes an orbital navigation simulator with a wide variety of flight characteristics ranging from the Project Mercury capsule to a powered space glider. However, since its specific purpose is for the study of boosted, unpowered hypersonic gliders, the description is framed within the problems accompanying such flight, i. e. orbital, re-entry and hypersonic glide. A full orbital and re-entry run in the simulator is described in considerable detail. 1.

13,109

Lewis, C. ARMY TO EVALUATE BELL HELICOPTER ILS. Aviation Week, Jan. 1959, 70(2), 61-67.

The Bell Helicopter Corporation helicopter instrument landing system for use in remote areas is described briefly. The major components include the simplified pilot information display and instrument

panel and the ground beacon. The beacon is a microwave transponder which assists the pilot in landing by providing information about azimuth and elevation of the beacon in relation to the helicopter, distance and ground speed. The display and panel are equipped with several new automatic components--the integrated system allowing the pilot to fly by monitoring two displays. 1.

13,110

Rosenblut, B., Bilger, R.C. & Goldstein, R. ELECTRO-PHYSIOLOGIC RESPONSES TO SOUND AS A FUNCTION OF INTENSITY, EEG PATTERN AND SEX. *J. Speech Res.*, March 1959, 2(1), 28-39.

The aims of this study were: 1) to study the proportion of electrodermal (EDR) and electroencephalic (EER) responses as a function of intensity close to threshold of hearing, 2) to learn how the percentage of responses varies with sex and with pattern of the EEG, and 3) to derive a criterion for the estimation of threshold from the percentage of EDR and EER as a function of intensity. Subjects were 22 men and 14 women (17-40 years) with normal hearing. The aforementioned responses were recorded simultaneously from the subjects while tones of 1000 cps at -5, 0, +5 and +10 db sensation level were presented in random order in either ear. The data were evaluated by analysis of variance and a criterion developed for estimation of threshold. T. G. I. R 12

13,111

Mysak, E.D. PITCH AND DURATION CHARACTERISTICS OF OLDER MALES. *J. Speech Res.*, March 1959, 2(1), 46-54. (University of Connecticut, Storrs, Conn.).

This study was aimed at determining the central tendency data for six criteria variables: 1) mean and median vocal frequency level, 2) total range, 3) functional range (between fifth and 95th percentiles), 4) standard deviation of individual's distribution of vocal frequencies, 5) words per minute, and 6) phonation/time ratio under conditions of oral reading and impromptu-speaking for older males. Two groups (12 each), 65-79 years and 80-92 years, and one group (15) of sons, 32-62 years participated. Analysis of variance technique was used to interpret the differences between the age groups and correlation analysis to test for family relationships. T. G. R 25

13,112

Wang, W. S-Y. TRANSITION AND RELEASE AS PERCEPTUAL CUES FOR FINAL PLOSIVES. *J. Speech Res.*, March 1959, 2(1), 66-73. (University of Michigan, Ann Arbor, Mich.).

To investigate the significance of various acoustical cues in the perception of final plosive consonants, 64 monosyllabic words recorded naturally and with systematic

modifications were presented to two groups of 20 listeners, one with intensive phonetic training and one with no background in phonetics. The perception of plosives and duration of gaps were correlated. Results are discussed with suggestions in the direction of an absolute scale of measurement for phonetic differences between speech sounds regardless of linguistic code. T. G. I. R 11

13,113

Pierson, W.R. & Rasch, P.J. DETERMINATION OF A REPRESENTATIVE SCORE FOR SIMPLE REACTION AND MOVEMENT TIME. *Percept. Mot. Skills*, June 1959, 9(2), 107-110. (College of Osteopathic Physicians and Surgeons, Los Angeles, Calif.).

The aim of this study was to determine the number of trials necessary to reach a representative performance level in reaction time and movement time and to study the effect of chronological age on the improvement of these through practice. These measures were: time to release a switch upon presentation of a light stimulus and time to extend the arm upon release of the switch. Two hundred sixty male subjects (8-30 years) were tested for 30 trials. Successive five-trial blocks were compared for differences in performance by the analysis of variance technique. The Kruskal-Wallis one-way analysis of variance was used to test the age factor. T. G. R 13

13,114

Peterson, G.E. VOWEL FORMANT MEASUREMENTS. *J. Speech Res.*, June 1959, 2(2), 173-183. (University of Michigan, Ann Arbor, Mich.).

This paper discusses the measurement of formant frequency according to the concept of the vocal mechanism as the basic information source in speech communication. The formant frequencies represent essential acoustical properties of the vocal mechanism. The problems in detection of these frequencies and subsequent measurement with present spectrographic instruments and techniques are discussed. A procedure which provides the most meaningful data regarding vowel formant frequencies is indicated. G. I. R 16

13,115

Tillman, T.W. & Jerger, J.F. SOME FACTORS AFFECTING THE SPONDEE THRESHOLD IN NORMAL-HEARING SUBJECTS. *J. Speech Res.*, June 1959, 2(2), 141-146. (Northwestern University, Evanston, Ill.).

To isolate the effects of two variables: 1) knowledge of spondee test vocabulary and 2) practice in responding to faint spondee words on the spondee threshold, 30 subjects (normal-hearing screened at hearing level of ten db at each octave interval from 125

to 8000 cps) were first measured for a 1000-cps pure tone threshold and two separate spondee word thresholds, then with ten subjects in each of three groups, they were subjected to different amounts of practice and prior knowledge and again measured. The experimental material (recorded List E of CID Auditory Test W-1) and procedure (up-and-down method of threshold measurement) were standard. T. R 3

13,116

Suddon, Florence H. & Link, J.D. HANDEDNESS, BODY ORIENTATION, AND PERFORMANCE ON A COMPLEX PERCEPTUAL-MOTOR TASK. Percept. Mot. Skills, June 1959, 9(2), 165-166. (University of Toronto, Canada).

To examine left- and right-handed performance on a complex motor task, 15 left- and 15 right-handed male university students performed on the Toronto Complex Coordinator. The three measures were: total number of matches, error-match ratio, and error persistence-total error ratio. An analysis of variance was done on each measure. R 8

13,117

Wertheimer, M. & Arena, A.J. EFFECT OF EXPOSURE TIME ON ADAPTATION TO DISARRANGED HAND-EYE COORDINATION. Percept. Mot. Skills, June 1959, 9(2), 159-164. (University of Colorado, Boulder, Colo. & Albany Medical College, Albany, Ga.).

To determine the effect of exposure time on the adaptation to disarranged hand-eye coordination, 50 male undergraduates (ten for each exposure condition) performed a writing task in which the visual and kinesthetic images were in conflict. There were five exposure times ranging from one second to 20 seconds; therefore, the amount of sensory-motor "practice" in the disarranged condition varied from almost none to about 20 seconds. The results are compared to those of R. Held and the differences discussed in terms of procedure. G. I. R 4

13,118

Vernon, J.A., McGill, T.E., Gulick, W.L. & Candland, D.K. EFFECT OF SENSORY DEPRIVATION ON SOME PERCEPTUAL AND MOTOR SKILLS. Percept. Mot. Skills, June 1959, 9(2), 91-97. (Princeton University, Princeton, N.J.).

To determine the effects of sensory deprivation on several perceptual and motor skills, nine male subjects were confined to a light and sound proof chamber for periods of 24, 48 or 72 hours, before and after which (immediately after and 24 hours after) they performed on five tests: color perception, depth perception, pursuit rotor, mirror drawing and rail walking. This performance was compared to that of a

control group of nine matched subjects and the differences evaluated by a Wilcoxon test. T. R 7

13,119

Sweeney, R. CRASH OF ELECTRA MAY ACCELERATE STUDIES TO IMPROVE PILOT DISPLAY. Aviation Week, Feb. 1959, 70(7), p. 37.

This is a brief note indicating the need for improvement of pilot displays. This interest has been revived as a result of recent indications that the drum pointer altimeter is subject to misreading.

13,120

Yaffee, M. CHAMBER SIMULATES SPACE ENVIRONMENT. Aviation Week, April 1959, 70(15), 91-96.

This article describes the latest project of the Air Force on development of a universal test chamber to simulate all environmental factors from 75,000 feet out through interplanetary space. In a separate project the problem of nuclear environment simulation was studied, and a facility capable of simulating such radiation is under construction. Also the importance of combined environmental testing for various equipments is indicated. Finally the estimated costs of such simulation facilities are presented. Included is a chart which summarizes the characteristics of various simulation facilities. I.

13,121

Squires, P.C. PROPOSED SHAPE OF THE NORMAL WORK AREA. Engng. Industr. Psychol., 1959, 1(1), 12-17. (USN Medical Research Lab., Naval Submarine Base, Conn.).

This is a description and definition of the "normal" work area which revises that found in standard textbooks. The characteristics of the revised area include an increase in size, an increase in the length of the curved boundary and greater naturalness and ease of operation. The desirability of the contour of this boundary (prolate epicycloid), in terms of compact panel work areas, is discussed. I. R 3

13,122

Stewart, E. LONG RANGE PLANNING-A KALEIDOSCOPIC VIEW. Operat. Res., July-Aug., 1958, 6(4), 552-560. (Vertol Aircraft Corporation, Morton, Penn.).

This article describes corporate long-range planning for aircraft manufacture. Corporate goals in an expanding economy are indicated; the time span, administrative organization and procedures for such planning also are presented. G

13,123

Bartley, S.H. & Thompson, R. A FURTHER STUDY OF HORIZONTAL

IV 70

13, 124

ASYMMETRY IN THE PERCEPTION OF PICTURES. *Percept. Mot. Skills*, June 1959, 9(2), 135-138. (Michigan State University, Ann Arbor, Mich.).

To determine whether there are differences in the perception of distances on the left as compared to the right portion of the visual field, 15 observers equated the size of the human figure in a large and a small photographic print (identical except for size) by adjusting the distance of the large print. Five sets of these prints were used; for each set the mask had been placed so the human figure occupied a different portion of the print. The data were analyzed by analysis of variance technique, and compared to those of other researchers. A principle is arrived at which accounts for the results obtained. T. 1. R. 2

13, 124

Bell, A.H. BILATERAL TRANSFER OF WORK DECREMENT EFFECTS AS A FUNCTION OF LENGTH OF REST. *Percept. Mot. Skills*, June 1959, 9(2), p. 181. (Veterans Administration Hospital, Augusta, Ga.).

This is a brief summary of an experiment designed to investigate whether the bilateral transfer of work decrement effects is the same function of the length of interpolated rest as is "bilateral reminiscence". Twenty-five right-handed male students practiced on a manual crank device under each of five rest conditions. A covariance analysis was employed to adjust post-rest scores in terms of pre-rest scores and to compare scores as a function of the rest condition. R. 2

13, 125

Bell, A.H. EFFECTS OF EXPERIMENTALLY-INDUCED MUSCULAR TENSION AND FREQUENCY OF MOTIVATIONAL INSTRUCTIONS ON PURSUIT ROTOR PERFORMANCE. *Percept. Mot. Skills*, June 1959, 9(2), 111-115. (Louisiana State University, Baton Rouge, La.).

To investigate the effects of muscular tension and motivational instructions on pursuit rotor performance, 216 male subjects (24 for each of nine experimental conditions) were tested. Tension was varied by the amount of weight subjects were required to hold in their non-preferred hands; motivational instructions by the frequency of introduction of instructions to improve. A Lindquist Type III factorial design was employed and an analysis of variance performed. The results are discussed in terms of their implications for Hull's theory. G. R. 10

13, 126

Butler, R.A. & Galloway, F.T. PERFORMANCES OF NORMAL-HEARING AND HARD-OF-HEARING PERSONS ON THE

DELAYED FEEDBACK TASK. *J. Speech Res.*, March 1959, 2(1), 84-90. (University of Chicago, Chicago, Ill.).

To determine whether the delayed speech feedback task can effectively differentiate persons with mild to moderate hearing losses from those with normal hearing, 60 hard-of-hearing and 48 normal hearing persons read series of five two-digit numbers (flashed singly on a panel) under these conditions: no delayed feedback, 50 db delayed feedback, 80 db delayed feedback (delay is .17 second). Error scores for the two groups were compared by chi-square test, and the advantages and disadvantages of predicting hearing loss from this measure of feedback disturbance are discussed. T. 1. R. 4

13, 127

Chase, R.A., Sutton, S. & First, Daphne. BIBLIOGRAPHY: DELAYED AUDITORY FEEDBACK. *J. Speech Res.*, June 1959, 2(2), 193-200. (Columbia University, New York, N.Y.).

This bibliography systematically reviews the published literature and includes current titles (obtained through correspondence) and a section on related topics. R. 147

13, 128

McKennell, A.C. SINGLE STIMULI JUDGMENTS BASED ON A STANDARD OF FAMILIAR SIZE. *Percept. Mot. Skills*, June 1959, 9(2), 119-126. (University of Glasgow, Glasgow, Scotland).

To examine the application of the principles of judgment of size when the standard is based on a familiar object, subjects judged a series of different-sized reproductions of an ordinary matchstick by the method of single stimuli when the center of the stimulus series and the norm based on prior experience did not coincide exactly. Also series of large stimuli were presented in order to determine the shift in the standard. Analysis of variance and t tests were employed to compare the judgments. T. R. 15

13, 129

Churchill, A.V. NOTE ON "COMPARISON OF TWO VISUAL DISPLAY PRESENTATIONS". *Percept. Mot. Skills*, June 1959, 9(2), p. 118. (Defense Research Medical Labs., Toronto, Ontario, Canada).

This note describes a repeated experiment which compared dial reading time and accuracy on two visual displays: a panel of dials and a photographic slide of the panel. Ten subjects participated. The results are discussed and compared to the earlier data. R. 2

13, 130

Comalli, P.E., Jr., Wapner, S. & Werner, H. EFFECT OF MUSCULAR

INVOLVEMENT ON SIZE PERCEPTION. *Percept. Mot. Skills*, June 1959, 9(2), p. 116. (Clark University, Worcester, Mass.).

To determine whether apparent tactual size of an object varies depending on the degree of tension with which it is held by thumb and forefinger, 34 subjects matched the distance between one pair of rods to that between another pair (the standard) by grasping one pair with each hand. The two main conditions were with and without the application of pressure for an equal number of judgments with each hand. R 1

13,131

Draper, M.H., Ladefoged, P. & Whitteridge, D. RESPIRATORY MUSCLES IN SPEECH. *J. Speech Res.*, March 1959, 2(1), 16-27. (University of Edinburgh, Edinburgh, Scotland).

This study investigated the action of some of the respiratory muscles during speech by electromyography. Simultaneous recordings also were made of oesophageal pressure, volume of air in the lungs and wave form of utterances. Data were obtained from 18 subjects, five of whom served as principal subjects, for spontaneous conversation, word lists, and short sentences. The recordings indicate the pattern of change-over from the use of one muscle to another as volume and pressure changes. These data are reduced to a schematic form from which predictions of muscle involvement can be made. G. I. R 11

13,132

Houss, A.S. A NOTE ON OPTIMAL VOCAL FREQUENCY. *J. Speech Res.*, March 1959, 2(1), 55-60. (Syracuse University, Syracuse, N.Y.).

"This article describes a physical characteristic of vowel production sufficient to account for systematic and presumably perceptible variations in overall vowel level as a function of vocal frequency." The discussion is in terms of the adequacy of current methods for locating optimum pitch levels. G. I. R 5

13,133

Jerger, J.F., Carhart, R., Tillman, T.W. & Peterson, J.L. SOME RELATIONS BETWEEN NORMAL HEARING FOR PURE TONES AND FOR SPEECH. *J. Speech Res.*, June 1959, 2(2), 126-140. (Northwestern University, Evanston, Ill.).

To determine the physical discrepancy between thresholds for a 1000-cps pure tone and for speech, both thresholds were measured in three groups of normal-hearing subjects. The specific variables examined were: sophistication of listener, effect of practice, method of threshold determination, order of test administration, sex, ear and familiarity with test vocabulary. The

preliminary experiment used two groups of ten each to examine the first two variables. The main experiment used 96 (third group) to study the other variables (five-factor design). Analysis of variance was employed to interpret the threshold differences for pure tone and spondee words as a function of the above variables. T. I. R 14

13,134

Harris, B., Hauptschein, A. & Schwartz, L.S. OPTIMUM INFORMATION-ACQUISITION SYSTEMS. *Operat. Res.*, July-Aug., 1958, 6(4), 516-529. (College of Engineering, New York University, New York, N.Y.).

This paper suggests and describes a criterion for rating communication systems which takes into account both the cost of a decision and the corresponding information cost, both of which depend on the magnitude of the parameter's power, bandwidth and time. Optimum operating condition (i.e. reliability) for three kinds of binary communication systems (unidirectional, bidirectional employing information feedback, bidirectional employing decision feedback) is determined. R 9

13,135

Branch, M.C. THE CORPORATE PLANNING PROCESS. PLANS, DECISION, IMPLEMENTATION. *Operat. Res.*, July-Aug., 1958, 6(4), 539-552. (Ramo-Woolridge Corporation, Los Angeles, Calif.).

This article defines and explains the different categories of comprehensive planning as it refers to business and industry. Specifically, the three phases of such a corporate planning process in operation plans, decision, implementation - are described for a fully developed program.

13,136

McEachron, W.D. FEEDBACK AND FEEDBACK IN BUSINESS PLANNING. *Operat. Res.*, July-Aug., 1958, 6(4), 560-572. (Standard Oil Company of Indiana, Chicago, Ill.).

The importance of prediction and feedback as components of business planning is discussed and illustrated by a description of such procedure for a large-size corporation which is engaged in the manufacture and sale of essential consumer goods. G. I.

13,137

Arnoff, E.L., Kania, E.B. & Day, Elizabeth S. AN INTEGRATED PROCESS CONTROL SYSTEM AT THE CUMMINS ENGINE COMPANY. *Operat. Res.*, July-Aug., 1958, 6(4), 467-497. (Operations Research Group, Case Institute of Technology, Cleveland, Ohio).

This article analyzes order processing and production scheduling for a company.

13,138

with large inventory accompanied by excessive costs. The procedure for solution of this problem is outlined and a detailed schedule for implementing these changes is set forth. Included are the development of mathematical models and decision rules. T. G. 1.

13,138

Flickinger, D. ZERO GRAVITY EFFECTS LARGELY UNKNOWN. Aviation Week, Jan. 1959, 70(1), 35-39.

This is one part of a survey on the ability of man to function usefully in the weightless state. Existing data on this and other bio-medical aspects of space flight are reviewed briefly and discussed in terms of physiological effects and indications for new types of equipment. The physiological parameters include motion sickness, gastrointestinal problems, and skeletal muscle activity problems. Types of equipment needed include all manner of devices for simulators and trainers plus those for food storage and dispensing.

13,139

Fusca, J. A. ICAO WILL TRY TO SETTLE NAV AID DISPUTE. Aviation Week, Feb. 1959, 70(5), 34-37.

This article describes the problems arising from the physical limits of optical resolution as it relates to reconnaissance. Both the optical limits of the apparatus and of the human are considered. In the former category, diffraction phenomena are considered as they relate to diameter of the objective and wavelength of the observed radiation. In the latter category, visual acuity limits are considered which take account of target size and contrast. The principle of image enhancement as an aid to improved image resolution is described and illustrated. G. 1.

13,140

Stanfield, R. I. ADDITION OF FLASHER LIGHTS AIDS LAGUARDIA RUNWAY IDENTIFICATION. Aviation Week, Feb. 1959, 70(8), 37-38.

This note describes the condenser discharge flasher lights which have been and are being installed on some LaGuardia runways as a measure toward improved runway identification.

13,141

Aviation Week. HUMAN ASPECT SPECIALISTS AID DESIGNERS. Aviation Week, March 1959, 70(9), 72-73.

This is a brief presentation of the role of the human engineering specialist in the design of various machinery. In particular, the role of the consultant as represented by Dunlap and Associates is indicated. Some of the kinds of problems handled are demonstrated in a brief account of Dunlap's work

on the Navy's Polaris missile and the Polaris-carrying high speed submarine.

13,142

Llewellyn-Thomas, E. SUCCESSIVE TIME ESTIMATION DURING AUTOMATIC POSITIVE FEED-BACK. Percept. Mot. Skills, Sept. 1959, 9(3), 219-224. (Defence Research Medical Labs., Toronto, Ontario, Canada).

The primary purpose was to describe and demonstrate a method to investigate time estimation which employs positive feedback as an aid in stabilizing judgments quickly. A visual stimulus was employed here; 75 subjects participated. The first stimulus was five seconds in duration and each succeeding one was the subject's most current reproduction. The results were discussed briefly in terms of the hypothesis and as a potential clinical diagnostic aid. T. G. R 4

13,143

Aviation Week. AEROMED FACILITY STUDIES SHOCK ABSORBER SEATS FOR JET PASSENGERS. Aviation Week, May 1959, 70(21), p. 136.

This brief article describes an hydraulic shock absorber system whereby passengers in jet transports would be able to survive fairly high impact accelerations. The data from which the proposed system was designed were obtained by Cornell Automotive Crash Injury Research. Two methods of applying the shock absorbers for deceleration are described and seat fittings are indicated.

13,144

Tripp, C. A., Fluckiger, F. A. & Weinberg, G. H. EFFECTS OF ALCOHOL ON THE GRAPHOMOTOR PERFORMANCE OF NORMALS AND CHRONIC ALCOHOLICS. Percept. Mot. Skills, Sept. 1959, 9(3), 227-236. (Handwriting Institute, Inc., New York, N. Y.).

To compare motor functioning in normals and in alcoholics both when sober and when inebriated, a variety of handwriting tasks, e.g., standard sentence, u-shaped loops, were performed by 68 alcoholics and 18 normals (all were males 20-50 years). The following measures were obtained: pressure, variability, ataxia, speed. Each task was performed spontaneously and under instructions to write as lightly as possible. The performances of the two groups were compared when sober, when inebriated; also performances were compared within groups for these two conditions. These differences were analyzed by t, and discussed as a function of possible physiological and psychological conditions. T. 1.

13,145

Maltzman, I. SEX DIFFERENCES IN THE EFFECTS OF AMOUNT OF TRAINING

ON EINSTELLUNG. *Percept. Mot. Skills*, Sept. 1959, 9(3), 239-242. (University of California, Los Angeles, Calif.).

To determine whether there are sex differences in the effects of amount of training on Einstellung, 406 students, 136 men and 270 women, divided into four groups, received a single water-jar problem as an extinction test. One group (control) received the test problem without prior training, three groups (experimental) received 5, 10, and 20 problems which required a different solution from the test problem. The results were analyzed by chi square technique. Hypotheses were offered to account for the effects of the sex and training variables. T. R 7

13, 146

Goldberg, F.H. & Fiss, H. PARTIAL CUES AND THE PHENOMENON OF "DISCRIMINATION WITHOUT AWARENESS". *Percept. Mot. Skills*, Sept. 1959, 9(3), 243-251. (Research Center for Mental Health, New York University, New York, N.Y.).

To test the hypothesis that better than chance discrimination can occur only when the stimuli have been at least partially recognized, 28 male students responded to tachistoscopically exposed familiar geometric figures (square, circle, triangle) under three experimental conditions (following a threshold series): exposure time where partial recognition of the figure is possible (32 trials), same exposure time to check on effects of practice (32 trials), briefer exposure time where partial recognition was not possible (32 trials). The results were analyzed as a function of experimental conditions and discussed in terms of the concept of sensory threshold vs. continuous reception of information. T. R 21

13, 147

Aviation Week. MEASURING WHOLE-BODY RADIATION DETERMINES EFFECT ON X-15 PILOTS. *Aviation Week*, May 1959, 70(19), p. 69.

This article briefly mentions the use of a whole-body radiation counter for determining the effects of cosmic radiation on x-15 pilots. Some gross results from isolation and sensory deprivation studies are presented. Also a few problems that accompany the use of pure oxygen are indicated.

13, 148

Goldstone, S., Jernigan, C., Lhamon, W.T. & Boardman, W.K. A FURTHER NOTE ON INTERSENSORY DIFFERENCES IN TEMPORAL JUDGMENT. *Percept. Mot. Skills*, Sept. 1959, 9(3), p. 252. (Baylor University College of Medicine, Waco, Tex.).

This note describes an experiment which compares visual and auditory temporal judgments in order to determine the importance of visual field size. Twenty-one

subjects judged Second Estimation Points in the same manner as in previous studies; however, the visual stimulus situation was both small (1 degree) and large. Nonparametric techniques were employed to analyze the differences. R 1

13, 149

Spitz, H.H. FORMULAS FOR MEASURING RECOVERY FROM FIGURAL AFTEREFFECTS. *Percept. Mot. Skills*, Sept. 1959, 9(3), 253-254. (Edward R. Johnstone Training & Research Center, Bordentown, N.J.).

This note presents and describes two formulas for measuring recovery from figural after-effects, the first a measure of rate of recovery relative to the amount of total initial after-effect, the second a measure of the residual after-effect. R 1

13, 150

Quartermain, D. & Mangan, G. ROLE OF RELEVANCE IN INCIDENTAL LEARNING OF VERBAL MATERIAL. *Percept. Mot. Skills*, Sept. 1959, 9(3), 255-258. (Victoria University, Wellington, New Zealand).

To examine the relationship between relevance of the incidental to the intentionally learned material (words selected on basis of Thorndike-Lorge Word Count) and the amount of incidental learning occurring, 50 students (25 male, 25 female) were asked to select from a list a key word previously identified in a preliminary speed test. The remaining words (18) were relevant, less relevant or irrelevant to the key word. Recall and recognition scores were obtained for these three categories of words and the data analyzed by nonparametric techniques. T. R 4

13, 151

Smith, A.H. OUTLINE CONVERGENCE VERSUS CLOSURE IN THE PERCEPTION OF SLANT. *Percept. Mot. Skills*, Sept. 1959, 9(3), 259-266. (Defence Research Board, Toronto, Ontario, Canada).

To determine the accuracy of perceiving slant, percepts produced by stimuli with three degrees of closure were compared with those produced by stimuli with three degrees of freedom of outline convergence from other cues within the stimulus complex. Eleven students viewed monocularly and binocularly eight stimulus conditions (outline figures of rectangles and trapezia exposed in the frontal plane and at three angles of slant -10, 25, and 40 degrees) and recorded their percepts by setting a pointer on an ungraduated circular dial. The data were handled by analysis of variance by ranks and one-tailed sign tests. T. G. 1. R 8

13, 152

Goldstein, A.G. LINEAR ACCELERATION AND APPARENT DISTANCE. *Percept.*

13, 153

Mot. Skills, Sept. 1959, 9(3), 267-269.

(University of Missouri, Columbia, Mo.).

This is an exploratory investigation of the effects of linear, sagittal acceleration upon distance perception. Thirty-three subjects were accelerated from zero to 60 mph (in about 10 to 11 seconds) in a fluid drive automatic transmission automobile, while viewing an illuminated ring. The subjects reported any change in perception of the ring, e.g. size, distance, during forward and backward acceleration and deceleration. McNemars test of the significance of changes was employed to compare the effects of direction of acceleration. T.

13, 153

Arens, C. J. & Popplestone, J. A. VERBAL FACILITY AND DELAYED SPEECH FEEDBACK. Percept. Mot. Skills, Sept. 1959, 9(3), p. 270. (Western Michigan University, Kalamazoo, Mich.).

This note briefly describes an experiment aimed at examining the relationship between verbal facility and resistance to delayed speech feedback. Male students (30 each in low and high verbal group) read a passage of English under conditions of non-delay and delay. Differences in reading time were analyzed by t tests for both groups.

13, 154

Shephard, A. H. & Cook, T. W. BODY ORIENTATION AND PERCEPTUAL-MOTOR PERFORMANCE. Percept. Mot. Skills, Sept. 1959, 9(3), 271-280. (University of Toronto, Toronto, Ontario, Canada).

To investigate changes in performance of a particular control-display relation on the Toronto Complex Coordinator with systematic changes in body orientation during practice, six groups of ten male subjects each practiced for five successive five-minute periods at various combinations of four body positions. Performance (number of matches and number of errors per match in moving the control stick so as to light up a disc) measures were compared for the practice periods, and for body positions in pairs using t. The results are interpreted in terms of stimulus-response compatibility considering body position. T. G. I. R 6

13, 155

Crovitz, H. F., Daston, P. G. & Zener, K. E. LATERALITY AND A PHENOMENON OF LOCALIZATION. Percept. Mot. Skills, Sept. 1959, 9(3), p. 282. (Veterans Administration Hospital, Durham, N. C. & Duke University, Durham, N. C.).

This brief note describes a finding obtained in a preliminary study on the relationship between laterality (hand and eye dominance) and a perceptual localization phenomenon. R 3

13; 156

Thurlow, W. R. & Rawlings, I. L. RECOGNITION THRESHOLDS FOR SIMPLE TONAL PATTERNS. Percept. Mot. Skills, Sept. 1959, 9(3), 295-301. (University of Wisconsin, Madison, Wisc.).

To determine whether recognition thresholds for two-tone patterns are distinctly larger than for one-tone patterns, a series of experiments was performed in which such thresholds were obtained at two loudness levels for the simple tonal patterns (50 and 80 db) and at three levels for the two-tone patterns (80, 20 and 42 db). In the first two experiments only two subjects were used and the tones were between 897 and 1793 cps; in the last two 15 and 12 subjects were used and the tones were 1000 to 1600 cps. Analyses of variance were performed on the duration thresholds for each pattern in each experiment. G. R 5

13, 157

Kling, J. W., Williams, Joanna P., & Schlosberg, H. PATTERNS OF SKIN CONDUCTANCE DURING ROTARY PURSUIT. Percept. Mot. Skills, Sept. 1959, 9(3), 303-312. (Brown University, Providence, R. I.).

To study the relations of performance to an index of general activation, plantar skin conductance was measured during a rotary pursuit task. Three groups of 16 female subjects, after five minutes practice, were given different degrees of massing of practice and different lengths of work period. Performance scores were obtained for successive 45-second work periods and conductance readings were taken at 15-second intervals. The results are discussed in terms of reminiscence and relaxation and compared to other findings. T. G. R 17

13, 158

Thurlow, W. R. & Hartman, T. F. THE "MISSING FUNDAMENTAL" AND RELATED PITCH EFFECTS. Percept. Mot. Skills, Sept. 1959, 9(3), 315-324. (University of Wisconsin, Madison, Wisc.).

To explore further the perception of a "missing fundamental" when only three harmonics of a fundamental are used and to investigate individual differences in perception of the "missing fundamental," 35 subjects matched the pitch of several three-tone combinations of harmonics with an oscillator tone. The binomial test was used to analyze the differences in scores for the various conditions (different periodicities). The findings are discussed in terms of a possible neural time analyzing system. T. I. R 12

13, 159

Botha, E. EFFECT OF PREFERENCE ON PERCEPTION OF SIZE. Percept. Mot. Skills, Sept. 1959, 9(3), p. 325. (University of Cape Town, Cape Town, South Africa).

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This note offers an interpretation of data on size perception where size is perceived as smaller than life-size for those objects evoking an approach response and larger for those evoking an avoidance response. R 4

13, 160

Rhule, W. & Smith, K.U. EFFECT OF VISUAL PRETRAINING IN INVERTED READING ON PERCEPTUAL-MOTOR PERFORMANCE IN INVERTED VISUAL FIELDS. *Percept. Mot. Skills*, Sept. 1959, 9(3), 327-331. (University of Wisconsin, Madison, Wisc.).

To determine the effect of visual pretraining in perceptual inversion on perceptual-motor performance under inverted vision, 12 subjects read one page of such material each day for five days and then transferred to the writing task while a second group of 12 performed the writing task without reading practice. The writing task consisted of drawing dots, triangles and the letter a. The two performance measures were contact time and travel time, and separate analyses of variance were carried out on these data. G. I. R 2

13, 161

Burg, A. & Hulbert, S.F. DYNAMIC VISUAL ACUITY AND OTHER MEASURES OF VISION. *Percept. Mot. Skills*, Sept. 1959, 9(3), p. 334. (University of California, Los Angeles, Calif.).

This is a brief note of a study which investigated binocular dynamic visual acuity at four target velocities (60, 90, 120 and 150 degrees per second) with the head fixed or free and compared these scores to CFF and ACA ratio and Static Acuity. One hundred twenty subjects were employed. Correlations between each of these and the dynamic acuity scores were found. R 2

13, 162

Quinn, M., Kleeman, C.R., Bass, D. E. & Henschel, A. FURTHER STUDY OF SURVIVAL RATINGS WITH ADEQUATE WATER INTAKE. 64 12 001, 64 12 002, Rep. 205, March 1953, 17pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

To determine the body effects of consuming survival rations with an adequate water intake, ten males, after a nine-day control period, were divided into a protein (46.25 grams/day) and non-protein (.63 grams/day) group and given 900 calories and 27 cc. of water/kg. of lean body mass daily for nine days. The following analyses were made: body weight changes, nitrogen balance, water balance and body water changes, mineral balances, urine ketones, ammonia and titratable acid, and urine creatinine. General recommendations on

survival ration compositions are indicated. T. G. R 19

13, 163

Sampson, H. PACING AND PERFORMANCE ON A SERIAL ADDITION TASK. *Canad. J. Psychol.*, Dec. 1956, 10(4), 219-225. (Defence Research Medical Labs., Toronto, Ontario, Canada).

To determine the effects of pacing of digits and duration of each digit presentation on the task of serial addition, two experiments were performed in which subjects were given a series of 61 digits to add. In one, the digits were on for .4, .8, and 1.2 seconds and off for the same periods, thus giving five different paces. An analysis of variance was performed on these data. In the second, the digits were on for .3, .6, and .9 seconds and off the same periods. The data from the two were compared and discussed. T. R. 8

13, 164

Smith, A.A. & Boyes, G.E. OPTIMAL OPERATING CONDITIONS FOR RADAR DISPLAYS EMPLOYING MAGNESIUM FLUORIDE PHOSPHORS. *Canad. J. Psychol.*, Dec. 1956, 10(4), 248-252. (Defence Research Medical Labs., Toronto, Ontario, Canada).

To determine optimal conditions of bias and illumination for Plan Position Indicator displays using magnesium fluoride phosphors, visibility thresholds were determined for five subjects under 20 conditions of cathode-ray tube bias and ambient illumination variation. The illumination levels were: darkness, 0.1, 0.5, 1.0, and 1.2 foot-candles. Bias voltages were measured from Visual Reference (VRI) Intensity, 5, 10, and 15 volts positive from VRI. Mean visibility thresholds are recorded. The results are discussed in terms of their relation to other data obtained in this area.

13, 165

Lauer, A.R. & Suhr, Virginia, W. THE EFFECT OF A REST PAUSE ON DRIVING EFFICIENCY. *Percept. Mot. Skills*, Dec. 1959, 9(4), 363-371. (Iowa State College, Ames, Iowa).

This is a road study to test the effect of a rest pause on driving efficiency. Eighteen males participated under both conditions: with rest pause and refreshments at the beginning of each 50-mile cycle, with no pauses or refreshments. Several tests were given before and after driving, e.g., discriminative reaction time; parking efficiency and several intransit evaluations were made, e.g., accelerator movements, modal speed. Analysis of covariance was based on before and after scores, t tests were computed on the road evaluations. T. G. R 6

13, 166

13, 166

Gocka, E. F. CFF AND PHOSPHENE THRESHOLD MEASURES AS RELATED TO AGE AND EACH OTHER. *Percept. Mot. Skills*, Dec. 1959, 9(4), 373-374. (Veterans Administration Hospital, American Lake, Wash.).

This brief study investigated the relationship of phosphene and critical flicker frequency thresholds and age. After some preliminary training, these thresholds were obtained on 12 subjects by the bracketing method. Two scores, each based on ten determinations, were obtained from each subject. Correlations of these thresholds and age were obtained. T. R. 4

13, 167

Cook, T. W. CUMMULATIVE TRANSFER IN THE REPRODUCTION PATTERNS ON THE TORONTO PEG BOARD. *Percept. Mot. Skills*, Dec. 1959, 9(4), 375-385. (University of Toronto, Toronto, Ontario, Canada).

To investigate the cumulative transfer in reproducing patterns on the Toronto Peg Board, five groups of five subjects learned to reproduce each of five patterns of 25 colored pegs after five-second presentations. The presentations and attempts at reproduction continued until an errorless trial occurred. The interval between trials was 30 seconds and between learning periods was five minutes. Performance scores included form, displacement, and color errors. These measures were interpreted in terms of transfer effects. T. G. I. R. 5

13, 168

Conklin, J. E. LINEARITY OF THE TRACKING PERFORMANCE FUNCTION. *Percept. Mot. Skills*, Dec. 1959, 9(4), 387-381. (System Development Corporation, Santa Monica, Calif.).

To investigate the tracking performance function when control lag is varied between 0.0- and 1.0-second in 0.2-second intervals, one skilled subject performed ten trials each of pursuit and compensatory tracking with the various lag periods randomized over the trials. The displacements and slopes of the obtained curves were compared statistically. T. G. R. 3

13, 169

Hodge, D. C. EFFECTS OF VARIATION IN RIFLE SIGHTING RADIUS ON AIMING ERRORS UNDER TWO LEVELS OF ILLUMINATION. *Engng. Industr. Psychol.*, Summer 1959, 1(2), 40-48. (University of Rochester, Rochester, N. Y.).

To evaluate the effects of variation in rifle sighting radius on aiming errors under two levels of illumination, 60 ROTC cadets were tested in a laboratory environment with six sighting radii--12, 18, 24, 30, 36, 42

inches--at 50 and 1 foot-candle. The variable and constant aiming errors were measured and analyzed by analyses of variance. T. G. I. R. 10

13, 170

Trittipoe, W. J. POST-EXPOSURE RESIDUAL EFFECTS OF LOW-LEVEL NOISE. *J. Speech Res.*, Dec. 1959, 2(4), 336-339. (George Washington University, Washington, D. C.).

To determine whether a sound insufficient to produce a temporary threshold shift (TTS) can modify the recovery threshold to a more intense sound, TTS measurements were made following two conditions of exposure: one in which a period of silence followed a broad-band noise exposure, and one in which the same exposure was followed by noise at levels which alone do not produce TTS. The noise, 120 db. SPL (sound pressure level) was presented for three minutes; then three minutes of silence or of noise of 70 and 80 db. The data were analyzed by tests. G. R. 4

13, 171

Harford, E. R. & Jerger, J. F. EFFECT OF LOUDNESS RECRUITMENT ON DELAYED SPEECH FEEDBACK. *J. Speech Res.*, Dec. 1959, 2(4), 361-368. (McGill University, Montreal, Quebec, Canada & Northwestern University, Evanston, Ill.).

Delayed speech feedback behavior was compared in these groups: ten hearing-impaired subjects with recruitment, ten hearing-impaired subjects without recruitment, ten normal listeners, ten hearing-impaired with recruitment but without speech discrimination loss, and ten with artificially obstructed external canals. Each subject went through pure-tone testing, speech audiometric testing, and speech feedback testing. The delayed effect was measured at feedback sensation levels of 0, 10, 20, 30, 40, and 50 db. Median error scores were compared. Implications of these data for clinical predictors of spondee threshold are discussed. T. G. R. 3

13, 172

Feldt, L. S. THE LATIN SQUARE DESIGN IN SPEECH AND HEARING RESEARCH. *J. Speech Res.*, Sept. 1959, 2(3), 216-228. (University of Iowa, Iowa City, Iowa).

This paper describes the nature of the Latin square design, discusses the assumptions which underlie it, and outlines some of its advantages and limitations in speech and hearing research. The origin of the Latin square design is touched upon briefly and its modifications are noted, particularly as related to its use in psychological research. Some factors which can be dealt with effectively by this design, and which otherwise would impair the validity of the experiment

if allowed to operate out of control, are examined and discussed. A major limiting factor and its solution is also presented. Most of the discussion is based on a comparison of Latin design with simple factorial analyses. 1. R 5

13, 173

Chaiklin, J. B. THE RELATION AMONG THREE SELECTED AUDITORY SPEECH THRESHOLDS. *J. Speech Dis.*, Sept. 1959, 2(3), 237-243. (Stanford University, Stanford, Calif.).

This study investigated, on an exploratory basis, the relationships among speech reception threshold (SRT) for the Central Institute for the Deaf (CID) Auditory Test W-I spondaic words, speech detection threshold (SDT), and threshold of perceptibility for running speech (TPRS). Sixteen male and 14 female subjects, all with normal hearing, participated. All stimulus materials were tape recorded by one speaker; they consisted of lists A, B, and C of the CID W-I spondaic words for the SRT, and a sample of running speech for the SDT and TPRS. For statistical analysis of the data, t tests and correlation coefficients were run. The results are discussed and compared to previous findings. T. R 13

13, 174

Davidson, G. D. SIDETONE DELAY AND READING RATE, ARTICULATION, AND PITCH. *J. Speech Res.*, Sept. 1959, 2(3), 266-270. (Florida State University, Tallahassee, Fla.).

This study was aimed at determining the effect of external sidetone transmission times of approximately 0.0005 (shorter-than-normal), 0.0010 (normal), and 0.0015 seconds (longer-than-normal) on: 1) oral reading rate of normal speakers, 2) precision of articulation, and 3) pitch variability as measured by number, mean extent, and mean rate of inflections. Twenty-four college males with normal hearing participated. Subjects read several kinds of materials (e.g. five-syllable phrases, 70-word reading passage) with each of the sidetone delays. From the tape recordings of these readings, the aforementioned measures were obtained. Analysis of variance technique was used for evaluating the differences in the three measures per condition. T. R 4

13, 176

Snidecor, J. C., Rehman, I. & Washburn, D. D. SPEECH PICKUP BY CONTACT MICROPHONE AT HEAD AND NECK POSITIONS. *J. Speech Res.*, Sept. 1959, 2(3), 277-281. (University of California, Santa Barbara, Calif.).

This preliminary study is part of a larger program aimed at selecting microphones and pickup sites which give satisfactory intelligibility, quality, and usability

under high ambient noise. Specifically the present study investigated: the relative power of the vowels and the relative quality preference for a standard sample of continuous speech as picked up by a crystal vibration microphone at eight different locations on the head and neck. The vowels and a short speech sample of one talker were recorded from each position. Twenty-four judges rated the pleasing quality of the speech samples by paired comparison technique, and intelligibility on a five-point scale. The data were evaluated by analysis of variance and chi square. The implications of the findings are discussed briefly. T. G. 1. R 9

13, 177

Stromsta, C. EXPERIMENTAL BLOCKAGE OF PHONATION BY DISTORTED SIDETONE. *J. Speech Res.*, Sept. 1959, 2(3), 286-301. (Ohio State University, Columbus, Ohio).

To determine the influence of air-conduction sidetone signal distortion on the phonation of a vowel sustained in falsetto, and to probe the relationship of phase and distortion of signal to the experimental effect of phonatory blockage, eight normal-hearing male college students, after practice, sustained a vowel in falsetto under two experimental conditions: 1) the signal had no appreciable nonlinear distortion, and 2) the signal had 62.5 per cent nonlinear distortion. Phonations were scored by: 1) number of phonatory blockages, and 2) total time consumed by blockages. Additional groups of subjects, with no experience and with various kinds of experience, also participated under either the same conditions or additional ones. Sound spectrograms were obtained and analyzed. 1. R 33

13, 178

Christensen, J. M. TRENDS IN HUMAN FACTORS. *Hum. Factors*, Sept. 1958, 1(1), 2-7. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

This article attempts to describe and evaluate some of the changes in the human factors area since World War II. The limitations of the early work are indicated. Present and future trends are described for the following areas: controls, information displays, decision making, training, space travel. R 3

13, 179

Hickey, A. E., Jr. & Blair, W. C. MAN AS A MONITOR. *Hum. Factors*, Sept. 1958, 1(1), 8-15. (Electric Boat Div., General Dynamics Corp., Groton, Conn.).

This article proposes the use of the feedback principle in monitoring as well as in continuous control situations. A simple feedback model was discussed and the associated variables identified: frequency of observation and response, sensitivity, time

13, 180

constants in feedback and control, reversibility of control. Ten monitoring or vigilance experiments were analyzed in terms of the model. The model was extended to show monitors combined in series and in parallel. I. R 18

13, 180

McFadden, E. B. & Swearingen, J. J. FORCES THAT MAY BE EXERTED BY MAN IN THE OPERATION OF AIRCRAFT DOOR HANDLES. Hum. Factors, Sept. 1958, 1(1), 16-22. (Civil Aeronautical Medical Research Lab., CAA Aeronautical Center, Will Rogers Field, Okla.).

This study determined the torque exerted in the operation of each of six handle configurations by eight male subjects. These handles were presented on a test arrangement simulating an aircraft door. Three handle types--L-shaped, double L-shaped, and T-shaped--and two lengths--ten and four inches--were used. Torque was measured at 45-degree intervals in clockwise and counter-clockwise directions and under load conditions. For each subject, 19 anthropometric measurements were also obtained. The results are discussed in terms of the variables. T. I.

13, 181

Drillis, R. J. THE USE OF GLIDING CYCLOGRAMS IN BIO-MECHANICAL ANALYSIS OF MOVEMENTS. Hum. Factors, April 1959, 1(2), 1-11. (College of Engineering Research Div., New York University, New York, N. Y.).

This article discusses and illustrates three basic optical methods for recording movements: motion pictures, chronophotography and gliding cyclograms and describes in detail the methods of bio-kinematic and bio-kinetic analysis of gliding cyclograms. Some examples of biomechanical and ergological movements are worked through. G. I. R 28

13, 182

Warren, N. D. EDUCATIONAL PROGRAMS IN THE HUMAN FACTORS AREA. Hum. Factors, April 1959, 1(2), 12-15. (Dept. of Psychology, University of Southern California, Los Angeles, Calif.).

This paper briefly reports the nature of some of the recently developed programs leading to degrees in the human factors areas and the trends in this field. Two general types of programs are indicated and examples of these are briefly described. R 1

13, 183

Bamford, H. E., Hanes, L. F. & Wilson, S. E. MISSIONS FOR MANNED MILITARY SPACECRAFT. Hum. Factors, April 1959, 1(2), 16-29. (Ritchie and Associates, Inc., Dayton, Ohio).

This article was aimed at providing "a basis for planning the crew station development effort for the military spacecraft of the next decade." Accordingly, the military objectives have been studied and analyzed, e.g., training, navigation and guidance, communications, as well as human and technological resources, e.g., sensing or reading, interpreting. Finally, three missions are considered in relation to these objectives. T. R 40

13, 184

Fogel, L. J. A NEW CONCEPT: THE KINALOG DISPLAY SYSTEM. Hum. Factors, April 1959, 1(2), 30-37. (Reliability Group, Convair, San Diego, Calif.).

This article describes a technique of displays "which may be used to resolve sensory conflict between visual and kinesthetic inputs. The forces acting on the operator's kinesthetic senses are shown visually and related to the attitude of the airplane and to the earth's surface for both individual cockpit instruments and an integrated pictorial display." I.

13, 185

Morehouse, L. E. THE STRENGTH OF A MAN. Hum. Factors, April 1959, 1(2), 43-48. (University of California, Los Angeles, Calif.).

The strength of one man is shown graphically in 35 different ways; in addition he is described by 20 anthropometric measures. I.

13, 186

Tipton, C. L. & Birmingham, H. P. THE INFLUENCE OF CONTROL GAIN IN A FIRST-ORDER MAN-MACHINE CONTROL SYSTEM. Hum. Factors, Aug. 1959, 1(3), 69-71. (USN Research Lab., Washington, D. C.).

To investigate the effect of changes in control stick sensitivity upon tracking performance in a velocity control system, eight naval enlisted men received eight test runs on eight control sensitivities which ranged from 128 to 1. An integrated error score was obtained per sensitivity condition; these data were analyzed by Wilcoxin's sign test. T. G. I. R 9

13, 187

Kurke, M. I. OFFICIAL SYSTEM DESIGN AND THE EMPTY FIELD. Hum. Factors, Aug. 1959, 1(3), 72-74. (Dunlap and Associates, Inc., Washington, D. C.).

To determine significant equipment design parameters for overcoming the accommodation disturbances in untextured visual fields, six ground-based search systems were investigated using targets of 1/4 inch to 3 inches viewed against backgrounds of either sky alone or sky and terrain through each of four optical systems: two low power

telescopes, and two variable power rifle telescopes. Six enlisted men served as observers. The threshold data thus obtained were analyzed by analysis of variance technique. R 5

13, 188

Chapanis, A. & Lindenbaum, L. F. A REACTION TIME STUDY OF FOUR CONTROL-DISPLAY LINKAGES. Hum. Factors, Nov. 1959, 1(4), 1-7. (Johns Hopkins University, Baltimore, Md.).

Four control-burner arrangements as found on gas and electric stoves were evaluated by measuring reaction times and errors made by subjects whose task was to match a control with a particular burner as quickly as possible. Fifteen subjects were tested on each model. After an initial exposure to the model, each subject was tested for 80 trials. The error data were analyzed by the Kruskal-Wallis one-way analysis of variance; reaction times by analysis of variance. T. G. I. R 3

13, 189

Tobias, P. EFFECTS OF RADIATION ON PERFORMANCE. Hum. Factors, Nov. 1959, 1(4), 8-15. (Kerckhoff Labs., University of Southern California, Los Angeles, Calif.).

This article reviews and discusses some of the experimental studies on the effects of various types of radiation on learning, activity and manipulation, conditioning, and discrimination with the aim of providing some information on the changes in performance that might be expected in man under daily exposure to sublethal doses. Most of the work has been done on subhuman animals and the results were found to be contradictory in many cases. Some suggestions for future research are offered. R 39

13, 190

McFadden, E. B., Swearingen, J. J. & Wheelwright, C. D. THE MAGNITUDE AND DIRECTION OF FORCES THAT MAN CAN EXERT IN OPERATING AIRCRAFT EMERGENCY EXITS. Hum. Factors, Nov. 1959, 1(4), 16-27. (Civil Aviation Medical Research Lab., CAA Aeronautical Center, Will Rogers Field, Okla.).

This experiment determined the maximum force that men and women were capable of applying to emergency exit release mechanisms under various conditions. Both unprotected and rubber-covered handles on port and starboard sides were compared using right, left and both hands, operated from seated and standing positions. The findings are discussed in relation to design standards. T. G. I. R 1

13, 191

Muckler, F. A. HUMAN FACTORS RESEARCH ON WEAPON SYSTEMS PROJECT

TEAMS. Hum. Factors, Nov. 1959, 1(4), 28-31. (The Martin Company, Baltimore, Md.).

This brief article attempts to describe the roles of the human factors specialists and the problems they confront in meeting these roles. In addition, the nature and objectives of project research on weapon systems are indicated as well as the limitations of this research. Finally, the future developments necessary for making effective such research are presented. R 8

13, 192

Bamford, H. E., Jr. HUMAN FACTORS IN MAN-MACHINE SYSTEMS. Hum. Factors, Nov. 1959, 1(4), 55-59. (Boeing Airplane Co., Seattle, Wash.).

This paper analyzes the field of human factors in an attempt to discover its scope and organization. The field is first partitioned into three zones: systematic, functional, and general, and then into eight mutually exclusive, jointly exhaustive and interdependent sectors (e.g., human utility to system, behavioral characteristics of crew stations, behavioral demands on crew, ecological characteristics of crew, ecological demands on life support system). These are also defined and discussed. I. R 14

13, 193

Von Beckh, H. J. HUMAN REACTIONS DURING FLIGHT TO ACCELERATION PRECEDED BY OR FOLLOWED BY WEIGHTLESSNESS. J. Aerospace Med., June 1959, 30(6), 391-409. (USAF Aeromedical Field Lab., Holloman AFB, N.M.).

The literature on weightlessness is reviewed; it includes experiments in aircraft, in rockets, and in other methods. The present study used a F-94C jet in the following flight program: pre-weightlessness acceleration simulating the thrust of a rocket, weightlessness following burnout by a diving spiral of 40 to 60 seconds duration, post-weightlessness acceleration simulating re-entry by a Keplerian trajectory. The subject sat upright and was instructed to avoid fighting the g; the pilot was protected by an anti-g suit. Electrocardiograms, GSR's, continuous motion pictures, and voice recordings were obtained and interpreted. T. I. R 24

13, 194

Langham, W. H. IMPLICATIONS OF SPACE RADIATIONS IN MANNED SPACE FLIGHTS. J. Aerospace Med., June 1959, 30(6), 410-417. (Los Alamos Scientific Lab., University of California, Los Alamos, N.M.).

The effects of ionizing radiation, acute, chronic, delayed, are described in detail. The two major potential radiobiological problem areas in space and thus in manned space flight, heavy primary cosmic rays and the

13, 195

Van Allen layers, are described together with their potential danger. T. G. I. R 25

13, 195

Kraft, J. A. MEASUREMENT OF STRESS AND FATIGUE IN FLIGHT CREWS DURING CONFINEMENT. J. Aerospace Med., June 1959, 30(6), 424-430. (Lockheed Aircraft Corporation, Marietta, Ga.).

This paper discusses some of the problem areas and experimental approaches in the measurement of stress and fatigue in flight crews during confinement. A facility is described which has considerable flexibility for conducting a variety of human factors studies. Variables can be manipulated, controls exercised, and many measures taken simultaneously. 1.

13, 196

Kaehler, R. C. HUMAN PILOT PERFORMANCE DURING BOOST AND ATMOSPHERE REENTRY. J. Aerospace Med., July 1959, 30(7), 481-486. (Human Factors Group, North American Aviation, Inc., Los Angeles, Calif.).

The objectives here were to: 1) compare and evaluate pilot performance using center and right-hand stick configurations during varied accelerations, 2) evaluate the proposed X-15 armrest, 3) evaluate integrated harness, head restraint and general physiological tolerance aspects during special and unusual accelerative conditions. The centrifuge was programmed for boost and emergency re-entry conditions; a tracking task was employed. Mean integrated error rate as a function of roll, pitch, and control stick is indicated. G. R 3

13, 197

Konecni, E. B. & Trapp, R. CALCULATIONS OF THE RADIO-BIOLOGIC RISK FACTORS IN NUCLEAR-POWERED SPACE VEHICLES. J. Aerospace Med., July 1959, 30(7), 487-506. (Douglas Aircraft Company, Santa Monica, Calif.).

This article evaluates the risk factors involved in manned space flight by calculating human risk in direct and scattered radiations at various separation distances from the reactor and at different power outputs without shielding and with varying amounts of shielding weights. The biological aspects of ionizing radiation are discussed including pathological effects. The assumptions used for calculating these radiations and shieldings are listed and then the calculations presented. Two flight missions--Earth to Mars and Mars to Earth--are used to illustrate radiation doses and shield weights. T. G. I. R 31

13, 193

Jacobius, A. J. BIBLIOGRAPHIC CONTROL OF AVIATION AND SPACE MEDICAL LITERATURE. J. Aerospace

Med., July 1959, 30(7), 507-516. (Science and Technology Div., Library of Congress, Washington, D. C.).

The scope, purpose, and organization of aviation and space medicine bibliographies are briefly discussed; their historical development is outlined; and their most representative products are listed. The rate of literature growth is indicated as well as the need for improving methods and techniques of bibliographic coverage and documentation.

13, 199

Zeller, A. F. HUMAN ASPECTS OF MID-AIR COLLISION PREVENTION. J. Aerospace Med., Aug. 1959, 30(8), 551-560. (USAF Directorate of Flight Safety Research, Norton AFB, Calif.).

The role of the pilot in mid-air collision is discussed, particularly in terms of the limitations in the perceptual and decision-making processes of the individual. Factors limiting the successful prevention of mid-air collisions are considered: e.g., cockpit design, pilot training and experience, boredom, fatigue, special hazards and age. Possible solutions are analyzed, generally within the framework of air-traffic control. Included are Air Force air collision statistics. T.

13, 200

Ward, J. E., Hawkins, W. R. & Stallings, H. D. PHYSIOLOGIC RESPONSE TO SUBGRAVITY. II. INITIATION OF MICTURITION. J. Aerospace Med., Aug. 1959, 30(8), 572-575. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

This study was concerned with the elimination of liquid body wastes in the null-cavity state. Specifically the accomplishment of urination was observed for 26 male subjects during 30 to 40 seconds of weightlessness in an F-94C Starfire jet under special flight maneuvers. A urine receptacle, fabricated from scrap oxygen hose and a weather balloon, was used since the relief tube was completely unacceptable. Thirty-seven flights were made. Implications for space flight are indicated. T. I. R 3

13, 201

Glenn, W. G. PRELIMINARY STUDY OF HUMAN SERA IN SUBJECTS EXPOSED TO SIMULATED ALTITUDE. J. Aerospace Med., Aug. 1959, 30(8), 576-579. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

This is an immunochemical study of human sera from subjects constantly exposed for eight days to effective altitude chamber conditions from 10,000 to 17,000 feet. The conditions permitted limited samples of blood to be obtained before, during, and after the chamber test. The

sera were analyzed for total protein concentration and albumin-globulin ratios. Further research is indicated. G. R 7

13,203

Schaefer, H.J. RADIATION DOSAGE IN FLIGHT THROUGH THE VAN ALLEN BELT. *J. Aerospace Med.*, Sept. 1959, 30(9), 631-639. (USN School of Aviation Medicine, Naval Air Station, Fla.).

The composition of the Van Allen belt is described in detail. The problem of adequate shielding is discussed in terms of these components and the weight problem. The radiation dose on a lunar trip is investigated for two different trajectories--transfer ellipse and radial shot. Also, the polar escape route is considered. G. 1. R 3

13,204

Diamond, S. TIME, SPACE AND STEREOSCOPIC VISION. *J. Aerospace Med.*, Sept. 1959, 30(9), 650-663. (Pacific-Alaska Div., Pan-American World Airways, San Francisco, Calif.).

To determine the function and usefulness of stereoscopic vision in aviation at increasingly high speeds of flight, theoretical stereoscopic ranges were calculated for different but constant parallax threshold differences and the time a pilot has available to fly through these ranges at different speeds was determined. Little known factors influencing spatial perception and stereoscopic range, e.g., hypoxia, acceleration, are indicated. Other calculations and estimations include minimum depth perceptive time and stereoscopic range-time. Critical airspeeds for these are also computed. G. 1. R 37

13,205

Kraus, R.N. DISORIENTATION IN FLIGHT. *J. Aerospace Med.*, Sept. 1959, 30(9), 664-673. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

The development of instrument flight and the physiological mechanisms involved in maintaining aerial orientation were briefly reviewed. Three experiments were performed: to determine the time it takes to make the transition from VFR to IFR, to determine the deviations in flight path which occur while an inflight cockpit procedure is performed, and to determine deviations in the flight path which occur during the absence of a visual reference. Three subjects flying F-100F aircraft were used. G. R 13

13,206

Ades, H.W., Morrill, S.N., Graybiel, A. & Tolhurst, G.C. THRESHOLD OF AURAL PAIN TO HIGH INTENSITY SOUND. *J. Aerospace Med.*, Sept. 1959, 30(9), 678-

684. (USN School of Aviation Medicine, Naval Air Station, Fla.).

To obtain systematic data on aural pain threshold produced by pure tone and wide band noise, two groups of subjects--one with no hearing at the highest sound level, one with some auditory sensation at sound levels above 115-120 db--presented with continuous sound beginning at 120 db and increasing in two db steps at two second intervals made judgments of: 1) feeling, 2) discomfort, and 3) pain. These thresholds were compared for the normal and deaf ears and possible explanations set forth. G. R 6

13,207

Glantz, W.M., Stenbridge, V.A., Dominguez, A.M., Goldbaum, L.R., et al. CARBON MONOXIDE DETERMINATION IN AIRCRAFT ACCIDENT FATALITIES. *J. Aerospace Med.*, Oct. 1959, 30(10), 711-715. (Aviation Pathology Section, US Armed Forces Institute of Pathology, Washington, D.C.).

In this investigation, 747 cases of aircraft accident fatalities were studied for the presence of carbon monoxide in post-mortem tissues. The carboxyhemoglobin levels were evaluated as to exposure to fire and viability at the time of the fire. T. R 7

13,208

Gerathewohl, S.J. WORK PROFICIENCY IN THE SPACE CABIN SIMULATOR. *J. Aerospace Med.*, Oct. 1959, 30(10), 722-735. (Bioastronautics Research Office, USA Medical Research and Development Command, Redstone Arsenal, Ala.).

These experiments attempted to assess work proficiency in an hermetically sealed cabin. The subject occupied a modified pilot seat in the simulator and did Kraepelin's work performance test, which requires continuous adding of single digits, for one-hour periods. Two subjects worked under temperatures of 26 to 36 degrees C at altitudes from 13,000 to 17,000 feet; the other under normal temperature, ground level conditions. The performance curves are compared among subjects for each of the nine days. T. G. 1. R 8

13,209

Zeller, A.F. AGE, EXPERIENCE AND AIRCRAFT ACCIDENTS. *J. Aerospace Med.*, Oct. 1959, 30(10), 736-750. (USAF Directorate of Flight Safety Research, Norton AFB, Calif.).

This paper evaluates the age, experience, aircraft-accident relationships and how these are affected by or affect the type of equipment flown, the type of accidents experienced, the portion of flight in which errors are most often committed, and the types of errors involved. Approximately 1500 air force accidents were

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13,210

considered. Tables of pilot errors vs. age, causative agency vs. age, phase of operation vs. age, type of accident vs. age, etc., were constructed. T. G. R 1

13,210

Goodson, J. E. & Miller, J. W. DYNAMIC VISUAL ACUITY IN AN APPLIED SETTING. *J. Aerospace Med.*, Oct. 1959, 30(10), 755-763. (USN School of Aviation Medicine, Naval Air Station, Fla. and Kresge Eye Institute, Detroit, Mich.).

To determine the relationship between performance in the laboratory and in the air on visual pursuit of moving targets, 15 males were tested using 12 sizes of Landolt "C" presented for 0.4 seconds, at angular velocities of 20, 69, and 90 degrees per second in the air, and at velocities of 20, 50, 75, 95, and 110 degrees per second in the laboratory. Acuity thresholds were compared for threshold method as well as laboratory versus air setting. Correlations and variance analyses were performed. T. G. I. R 6

13,211

Willis, H. S. K. & Hoffman, I. L. HEARING LOSS FROM HIGH INTENSITY SOUND OF JET ENGINES. *J. Aerospace Med.*, Oct. 1959, 30(1), 764-772. (USAF Hospital, Westover AFB, Mass.).

This field study analyzed the audiograms of 1685 persons exposed to high intensity sound from jet engines and a control group of 362 persons, in order to obtain evidence for the theory that repeated exposure to high intensity noise can be a primary cause of hearing loss. All subjects met pre-established criteria to insure no other compounding pathological condition existed. Some of the relationships examined were years of exposure and hearing loss, and age and exposure. Suggestions for testing such persons are indicated. T. R 19

13,212

Nareff, M. J. PASSENGER PHLEBITIS. *J. Aerospace Med.*, Nov. 1959, 30(11), 791-796. (USAF Hospital, Wiesbaden, Germany).

Eight cases of venous thromboembolism (Phlebitis) in human passengers who underwent long distance flights are discussed. Ten factors which may contribute to passenger phlebitis are considered and indexed for each of the eight passengers. These factors are: sex, age, usage of tobacco, obesity, past history (of related pathology), flight duration, seat type, onset in hours, pathology, and complications. The relation of leg movement and position, increase of intra-abdominal pressure and other factors which may contribute to phlebitis are considered. A recommendation concerning passenger immobility in flight is included. T. R 8

13,213

Sem-Jacobsen, C. W. ELECTROENCEPHALOGRAPHIC STUDY OF PILOT STRESSES IN FLIGHT. *J. Aerospace Med.*, Nov. 1959, 30(11), 797-801. (Electroencephalographic Lab., Gaustad Hospital, Vinderen, Oslo, Norway).

Eight channel EEG tracings were obtained from 30 experienced military jet pilots in order to determine: 1) the effect of combat flight stress on pilot consciousness level; 2) if the brain is stressed under combat flight conditions to such a degree that this stress can be measured by airborne EEG; and 3) if there is a correlation between the pilot's in-flight EEG, his ability to fly an interceptor, and his accident rate due to pilot error. The flight conditions were a composite of ten maneuvers common to combat interceptor flight. EEG tracings were compared with pilot flight performance. The feasibility of EEG as an in-flight determiner of physiologic response to flight stress is considered. T. G. R 3

13,214

Reinhardt, R. F. MOTION SICKNESS: A PSYCHOPHYSIOLOGIC GASTROINTESTINAL REACTION? *J. Aerospace Med.*, Nov. 1959, 30(11), 802-805. (Menninger Foundation, Topeka, Kan.).

This article suggests that susceptibility to motion sickness is governed by the pattern of the individual's psychological development and presents a concept of motion sickness as a psychophysiological reaction to stress. Further research on the relationship between psychological test results and motion sickness is indicated. R 9

13,215

Rowen, B. HUMAN FACTORS SUPPORT OF THE X-15 PROGRAM. *J. Aerospace Med.*, Nov. 1959, 30(11), 816-820. (USAF Flight Test Center, Edwards AFB, Calif.).

This article describes the human factors data which will be obtained during the flight phases of the X-15 program. Some of these physiological measurements are: body-surface temperature, electrocardiographic data, blood pressure, respiratory rate, whole-body cosmic radiation. A simulator for the X-15 is described, as well as protective equipment and the escape system.

13,216

Clarke, N. P. & Headley, R. N. STUDIES OF PRIMATE TOLERANCE TO COMPLEX ACCELERATIONS. *J. Aerospace Med.*, Nov. 1959, 30(11), 825-831. (University of Washington School of Medicine, Seattle, Wash.).

Five monkeys were exposed to complex accelerations similar to those of an unstable satellite re-entry. Simulated deceleration in the forward facing position up

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to 20 g was combined with sine wave pitch oscillations lasting up to 60 seconds through half amplitudes of 20 degrees at three and five cps. Maximum accelerations were recorded backward, footward, and headward. Ability of animals to make coordinated movements after centrifugation was observed. Post mortems on the animals were made to determine the locus of hemorrhages, evidence of brain damage, etc. T. G. 1. R 4

13, 217

Leverett, S.D. & Clarke, N.P. A TECHNIQUE FOR DETERMINING CHANGES IN FORCE OF CARDIAC CONTRACTION DURING ACCELERATION. *J. Aerospace Med.*, Nov. 1959, 30(11), 832-839. (USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio).

This article describes a technique for measuring changes in force contraction of the heart during positive acceleration in intact, anesthetized dogs, using modifications of the Walton-Brodie strain gage arch. The equipment and surgical technique are detailed. Three profiles of positive acceleration were studied using 11 animals: 1) rapid acceleration to 3g and centrifuged here for 15 seconds, 2) gradual acceleration with and without dibenzylamine, 3) positive acceleration of 3g for four to ten minutes. Arterial pressure and force contraction were compared. T. 1. R 10

13, 218

Phillips, P.B. & Zarriello, J.J. CENTRAL NERVOUS SYSTEM INJURY FROM HIGH RADIAL G FORCE. *J. Aerospace Med.*, Nov. 1959, 30(11), 847-851. (USN School of Aviation Medicine, Naval Air Station, Fla.).

A case of central nervous system injury from positive nine g stress is described. Neurological symptoms and results of examinations are included. Successful recovery is noted.

13, 219

Behnke, A.R. THE ESTIMATION OF LEAN BODY WEIGHT FROM "SKELETAL" MEASUREMENTS. *Hum. Biol.*, Dec. 1959, 31(4), 295-315. (USN Radiological Defense Lab., San Francisco, Calif.).

This study compared lean body weight (LBW) estimated from skeletal-anthropometric and x-ray-measurements with that estimated from body density and total body water determinations on 31 male subjects. Various combinations of the anthropometric and x-ray measurements were correlated with body density and body water determinations, thus demonstrating the greater role played by some dimensions in estimating LBW. Skeletal measurements and LBW proportionality constants for a Reference Man and Woman were derived. T. G. 1. R 18

13, 220

Roberts, D.F., Provins, K.A. & Morton, R.J. ARM STRENGTH AND BODY DIMENSIONS. *Hum. Biol.*, Dec. 1959, 31(4), 334-343. (Dept. of Human Anatomy, Oxford University, Oxford, England).

This study investigated the relationships between arm strength, arm morphology, and body size. Seven anthropometric measurements, e.g., stature, weight, were taken and three tests of muscle strength, e.g., hand grip, were administered on about 60 young adult males. Simple, multiple, and partial correlation coefficients among these measures were computed. Three factors were isolated to account for the greater part of the variance. T. R 29

13, 221

Montgomery, H. THE PHYSIO-PATHOLOGY OF IMMERSION FOOT. *Naval Research Reviews*, Sept. 1959, 14-19. (University of Pennsylvania, Philadelphia, Penn.).

Exposure of a part of the human body to cold water for long periods of time may cause an injury called "immersion foot." This report describes a series of studies, using rabbits as experimental subjects, on immersion foot. Preliminary prophylactic and therapeutic trials were made, followed by an extensive series on the degree of damage in the different tissues. The relative dysfunction of muscle and nerve were studied further. I.

13, 222

Kiessling, R.J. & Maag, C.H. NITROGEN NARCOSIS AND ITS EFFECTS ON PERFORMANCE. *Naval Research Reviews*, Dec. 1959, 6-12. (USN Experimental Diving Unit, Naval Gun Factory, Washington, D.C. & USN Physiological Psychology Branch, ONR, Washington, D.C.).

This report describes an initial experiment in a study directed toward the determination of the extent of behavioral impairment or decrease in performance efficiency and its systematic relation to increasing degrees of nitrogen partial pressure. Five subjects underwent three measures of performance--choice-reaction time, modified Purdue Pegboard Test (manual dexterity), and conceptual reasoning--at sea-level pressure, at simulated 100-foot salt-water pressure, and during decompression at ten-foot depths. Performance data were analysed for differences due to pressure level. The implications of the findings for increasing deep-sea divers' effectiveness and safety during rescue operations is discussed. I.

13, 224

Thurlow, W.R. & Elfner, L.F. PURE-TONE CROSS-EAR LOCALIZATION EFFECTS. *J. acoust. Soc. Amer.*, Dec. 1959, 31(12), 1606-1608. (University of Wisconsin, Madison, Wisc.).

To determine the frequency limits within which a tone in one ear would effect localization of a tone of a different frequency in the other ear, three experiments were performed. In Experiment I (12 subjects) separate tone sources were used for each ear to obtain an estimate of the shape of the function relating localization effect to frequency level of standard used. Experiment II examined three of the frequency ranges (600, 1000, and 4000 cps) used in Experiment I. In Experiment III four subjects examined binaural localization effects for low frequencies, with the frequency in one ear a simple multiple of that in the other. Some theoretical implications of the results are presented. T. G. R 6

13, 225

Wansdronk, C. ON THE INFLUENCE OF THE DIFFRACTION OF SOUND WAVES AROUND THE HUMAN HEAD ON THE CHARACTERISTICS OF HEARING AIDS. *J. acoust. Soc. Amer.*, Dec. 1959, 31(12), 1609-1612. (Philips Research Labs., N. V. Philips' Gloeilampenfabrieken, Eindhoven, Netherlands).

To assess the influence of diffraction of sound waves around the human head on the frequency characteristics of hearing aids, three specimens of hearing aids were measured on ten male and ten female subjects. Sound fields for each hearing aid were taped. The subjects, in four different experimental positions, were situated so that the hearing aid was at the same point as it was during the taping of the sound field. The taped sound field was played back and output of the hearing aid was measured. Other methods of measuring the effects of diffraction are discussed, and the possible use of a simulated "standard" head is investigated. G. I. R 2

13, 226

Pickett, J.M. BACKWARD MASKING. *J. acoust. Soc. Amer.*, Dec. 1959, 31(12), 1613-1615. (USAF Operational Applications Lab., Applications Research Branch, AFRC, Bedford, Mass.).

To determine the auditory masking effect of a noise burst on a preceding weak stimulus, three subjects were subjected to a short 1000-cycle tone which preceded a burst of white noise by a variable silent interval. Tone durations were 5, 10, 15, 20, 25 and 50 milliseconds; silent intervals were 0, 2, 5, 10, 25 and 100 milliseconds; and noise burst levels ranged from 50 to

130 db, above threshold. The threshold intensity level of the tone was taken as a measure of the masking provided by the noise burst. The relative contributions of the tone-noise interval (as opposed to the tone duration) as variables in backward masking are investigated. Implications for further research are suggested. G. R 7

13, 227

Pollack, I. & Trittipoe, W. INTER-AURAL NOISE CORRELATIONS: EXAMINATION OF VARIABLES. *J. acoust. Soc. Amer.*, Dec. 1959, 31(12), 1616-1618. (USAF Operational Applications Lab., Applications Research Branch, AFRC, Bedford, Mass.).

To examine the relationship between interaural noise identification and: 1) noise burst duration, 2) sound level, 3) frequency range, and 4) interaural noise level imbalance, experienced listeners made subjective discriminations in terms of the phenomenal "diffuseness" and "compactness" of the noise. Noise frequency spectrum was 100-6800 cps; duration of noise burst was 100 milliseconds; noise burst at earphones was 90 db; interaural balance was 0 db. Results also included a discussion of the interaction between noise level and burst duration. G. R 2

13, 228

Small, A.M., Jr. PURE-TONE MASKING. *J. acoust. Soc. Amer.*, Dec. 1959, 31(12), 1619-1625. (Depts. of Speech Pathology and Audiology and Psychology, State University of Iowa, Iowa City, Iowa).

To determine the influence of one pure tone on the threshold of another, six subjects of normal hearing (125-8000 cps) were utilized in determining the level of the masker necessary to mask a signal as a function of the frequency of the masker. Frequencies of the masked signal were: 400, 800, 1600, 3200 and 6400 cps. Frequencies of the masking signal were multiples of the masked signal and ranged from 0.05-3.0 times the masked signal. Results are discussed and related methods of investigating pure tone masking effects are considered. T. G. R 32

13, 229

Nicks, D.C. PREDICTION OF SEQUENTIAL TWO-CHOICE DECISIONS FROM EVENT RUNS. *J. exp. Psychol.*, Feb. 1959, 57(2), 105-114. (San Fernando Valley State College, San Fernando Valley, Calif.).

This study was an investigation of trial-by-trial behavior in sequential two-choice decision tasks (probability learning tasks, as a function of event runs). Seventy-two subjects made 380 anticipatory guesses

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of red or green light under the following conditions of red versus green light occurrence: 50:50, 67:33, 75:25, and 50:50 non-random sequence. Run curves were plotted for each group, showing the proportion of prediction of one event after n successive previous occurrences of that event and after n successive previous occurrences of the other event. Results were discussed in terms of decision-making and decision-making theory.
T. G. R 5

13, 230

Pollack, I., Johnson, L.B. & Knaff, P.R. RUNNING MEMORY SPAN. *J. exp. Psychol.*, March 1959, 57(3), 137-146. (USAF Operational Applications Lab., Bedford, Mass.).

To compare the recall of messages composed of randomly selected digits under two conditions of presentation, running digit spans (optimal reproduction of digits) were established for more than 68 subjects when the list of digits was: 1) of uncertain length and 2) of certain length. Further experiments examined the effects on the recall of uncertain and certain length messages of a number of other experimental variables. The results are discussed in terms of proactive interference and the behavioral strategy employed by the subjects.
T. G. R 4

13, 231

Beebe-Center, J.G., Rogers, M.S., Atkinson, W.H. & O'Connell, D.N. SWEETNESS AND SALTINESS OF COMPOUND SOLUTIONS OF SUCROSE AND NaCl AS A FUNCTION OF CONCENTRATION OF SOLUTES. *J. exp. Psychol.*, April 1959, 57(4), 231-234. (Harvard University, Cambridge, Mass.).

To determine the effect of concentration of solutes on sweetness and saltiness of compound solutions of sucrose and salt (NaCl), two subjects made four comparative judgments of sweetness on each of nine salt and sucrose compounds in solution and four matching judgments of sweetness on another 16 salt-sucrose compounds in solution. The compound solutions used were the 25 possible binary combinations of -.52, -.02, .48, .98, and 1.48 log grams NaCl and .001, .50, 1.00, 1.50, and 2.00 log grams sucrose per 100 centimeters tap water. Results are discussed in terms of masking effects and relation to masking effects of quinine sulfate and other experiments involving the interaction between salt and sucrose.
G. R 8

13, 232

Goldstone, S., Boardman, W.K. & Lhamon, W.T. INTERSENSORY COMPARISONS OF TEMPORAL JUDGMENTS. *J. exp. Psychol.*, April 1959, 57(4), 243-248. (Baylor University College of Medicine, Waco, Tex. & Houston State Psychiatric Institute, Houston, Tex.).

This paper investigates audio-visual differences in absolute judgments of (403) subject conceptualizations of one clock second, derived from judgments of lights and sounds from the following experimental conditions: 1) Successive auditory and visual judgments were obtained under the same conditions to determine the effect of prior experience on intersensory temporal (1.00 seconds) judgments. 2) Long (2.00 sec.) and short (.10 sec.) stimulus anchors under the same conditions were employed to determine the effect of recent and remote anchors upon audio-visual judgments of the apparent duration of one clock second. 3) To explore sensory dominance and stimulus effectiveness, auditory and visual signals were presented simultaneously, with varied intensity and instructions.
T. G. R 12

13, 234

Pearson, R.G. & Hauty, G.T. ADAPTIVE PROCESSES DETERMINING PROPRIOCEPTIVE PERCEPTION OF VERTICALITY. *J. exp. Psychol.*, June 1959, 57(6), 367-371. (Carnegie Institute of Technology, Pittsburgh, Penn. & USAF School of Aviation Medicine, Brooks AFB, Tex.).

To determine the effects of knowledge of results (KR) and alternation of tilt on perception of verticality, 96 subjects, on a lateral-tilt chair under darkroom conditions, were required to return themselves from a position of 30 degrees tilt to the perceived vertical (24 times each). Data were analyzed by means of analysis of variance. Functions of the effects of the two main variables were plotted. Results were considered in terms of experimental factors and competition between sensory events. Implications for the design of spatial orientation studies were discussed.

13, 235

Ingham, J.G. VARIATIONS IN CROSS-MASKING WITH FREQUENCY. *J. exp. Psychol.*, Sept. 1959, 58(3), 199-205. (Medical Research Council Neuropsychiatric Research Unit, Cardiff, Wales).

To determine the differential masking effect of one tone upon another in the opposite ear (cross-masking) when frequency separation of the two tones was separated, monaural thresholds were obtained from 30 subjects for six frequencies (600-1400 cps) determined before and during exposure to

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13,237

a continuous masking tone of constant frequency (30 db above threshold) using a modified method of limits. Functions are presented of the average masking effect for test tones of the different frequencies. Results were discussed in terms of three hypotheses: 1) mutual inhibition, 2) overlapping patterns of activity, and 3) a statistical model. G. R 13

13,237

Siegel, S. & Goldstein, D.A. DECISION-MAKING BEHAVIOR IN A TWO-CHOICE UNCERTAIN OUTCOME SITUATION. *J. exp. Psychol.*, Jan. 1959, 57(1), 37-42. (Pennsylvania State University, Philadelphia, Penn.).

This experiment tested the hypothesis: "that the asymptotic probability of S's predicting the occurrence of the more frequent event in a two-choice uncertain outcome situation is a function of the level of reinforcement present in the situation, such that the probability of predicting the more frequent event will tend toward unity as the rewards (positive utility) and costs (negative utility) of correct and incorrect predictions are increased." Thirty-six subjects (Ss) made predictions in a two-choice uncertain outcome situation according to one of three conditions: no payoff, reward, and risk. A nonparametric k-sample test against ordered alternatives was used to test the data. T. R 17

13,238

Kappauf, W.E. & Powe, W.E. PERFORMANCE DECREMENT AT AN AUDIO-VISUAL CHECKING TASK. *J. exp. Psychol.*, Jan. 1959, 57(1), 49-56. (University of Illinois, Urbana, Ill. & USAF Personnel and Training Research Center, Lackland AFB, Tex.).

To determine whether performance on an audio-visual checking task would change with time and whether such changes would be related to 1) rate of occurrence of discrepancies in the digit series or 2) aptitude level of the subject, 235 basic airmen, distributed over all four scoring categories on the Armed Forces Qualification Test (AFQT), were tested. Each subject listened to a continuous series of digits (on tape) and checked these against an almost identical series in a test booklet. The task continued uninterrupted for two hours. The discrepancies in the digits varied from 2 to 20 per 15-minute section. The results were analyzed by .05 level median tests and Pearson's r. G. R 4

13,239

Beck, J. STIMULUS CORRELATES FOR THE JUDGED ILLUMINATION OF A SURFACE. *J. exp. Psychol.*, Oct. 1959, 58(4), 267-274. (University of Pennsylvania, Philadelphia, Penn.).

This study was aimed at determining for surfaces with clearly perceptible pattern texture composed of two different intensities 1) whether consistent judgments of surface illumination can be made and 2) whether variables can be found in the light array which will specify these judgments. Observers adjusted the illumination on a comparison surface to match a standard surface for four different patterns, each at brightness levels of 1.1 and 3.2 ft-L. Each surface was viewed monocularly, simultaneously in a dark room. The standard had a grey background and white pattern and the comparison a black background and white pattern. Medians, confidence intervals, and ranges of the matches were determined. The possible correlates for such judgments are discussed. T. I. R 11

13,240

Engen, T. & Pfaffmann, C. ABSOLUTE JUDGMENTS OF ODOR INTENSITY. *J. exp. Psychol.*, July 1959, 58(1), 23-26. (Brown University, Providence, R.I.).

To determine 1) the greatest number of intensities of an odor that can be identified correctly by rank order, and 2) the effect of a) selection of the odorants, b) the size step between stimuli, c) intensity of stimuli, and d) practice and number of stimulus categories on accuracy of odor intensity identification, 250 absolute judgments of odor intensity for each of five sets of stimuli were made by eight experienced subjects. Four odorants (amyl acetate, n-Heptanal, n-Heptane, and Phenylethyl alcohol) were utilized at five concentrations (100, 50, 25, 12.5 and 6.25 per cent dilution). Data were analyzed by means of the "informational analysis" (Erickson and Hake). T. G. R 10

13,241

Carlson, V.R. AFTEREFFECT OF A MOVING PATTERN. *J. exp. Psychol.*, July 1959, 58(1), 31-39. (National Institute of Mental Health, Bethesda, Md.).

To determine the after-effect of a pattern of curved lines when the pattern was moving versus the after-effect of a stationary pattern, ten subjects made adjustments on a variable-curvature test line (to apparent straightness), following inspection of a pattern of alternating light and dark strips (each ten millimeters and 145 centimeters in radius of curvature). The inspection pattern either moved at rate of 24 millimeters/second or was stationary. An additional 15 subjects were utilized in control experiments. Data were analyzed in terms of correlation of curvature between inspection patterns and the lines adjusted by the subjects. Results were discussed in terms of effects of 1) motion, 2) optimum fixation time before eye movement, and 3) the interaction between movement and curvature of the inspection line. T. R 21

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13,242

McGuigan, F. J. THE EFFECT OF PRECISION, DELAY, AND SCHEDULE OF KNOWLEDGE OF RESULTS ON PERFORMANCE. *J. exp. Psychol.*, July 1959, 58(1), 79-84. (Hollins College, Hollins, Va.).

To determine the effect of 1) precision (specificity), 2) delay, and 3) schedule of knowledge of results (KR), on performance at a line drawing task, 84 female subjects performed on 70 "learning" trials and 70 extinction trials. The task was to draw a six-inch line while blindfolded. Values of precision (specificity) were one-eighth inch, five-eighths inch, and ten-eighths inch (subjects were told within these limits how much their lines deviated from the six-inch standard). Values of length of delay were 0, 15, and 30 seconds, and the values of KR furnished were 10, 55, and 100 percent. Results were analyzed by means of a three-by-three-by-three analysis of variance and discussed in terms of the interaction between the three variables. T. R 12

13,243

Underwood, B. J. & Schulz, R. W. STUDIES OF DISTRIBUTED PRACTICE: XIX. THE INFLUENCE OF INTRALIST SIMILARITY WITH LISTS OF LOW MEANINGFULNESS. *J. exp. Psychol.*, Aug. 1959, 58(2), 106-110. (Northwestern University, Evanston, Ill.).

To determine the influence of intralist similarity on the learning of lists of low meaningfulness and to explore the effect of intertrial interval, eight groups of 30 subjects learned one of four ten-nonsense syllable lists with either a two-second or seventeen-second intertrial interval. Each list was presented for 40 trials; the anticipation method was used. Correct responses were analyzed as a function of degree of intralist similarity, massed vs. distributed practice, and serial position in list. These results are compared to those from the previous study and interpreted as compatible with an inhibition (by interference) theory. G. R 2

13,244

Schnore, M. M. INDIVIDUAL PATTERNS OF PHYSIOLOGICAL ACTIVITY AS A FUNCTION OF TASK DIFFERENCES AND DEGREE OF AROUSAL. *J. exp. Psychol.*, Aug. 1959, 58(2), 117-128. (University of Western Ontario, London, Ontario, Canada).

To determine the effects of 1) task differences and 2) degrees of arousal on individual patterns of physiological activity, nine physiological functions were obtained from subjects while they performed at two tasks (tracking and arithmetic) under two levels of arousal (auditory distraction and electric shock). Results were analyzed by

means of analysis of variance, coefficient of concordance, and chi square and discussed in terms of intra-individual variability of physiological functions and the effectiveness of the various measures in differentiating among conditions. T. G. R 29

13,245

Murphy, F. E. EFFECTS OF THREAT OF SHOCK, DISTRACTION, AND TASK DESIGN ON PERFORMANCE. *J. exp. Psychol.*, Aug. 1959, 58(2), 134-141. (Johns Hopkins University, Baltimore, Md.).

To investigate the effects of threat of electric shock, aural distraction, and task design of performance, 80 male subjects dealt four decks of 32 cards, each deck consisting of different design patterns. Time taken to deal each deck and errors in identifications of patterns were recorded. Shock was administered through attached electrodes and aural distraction was induced by presenting random series of numbers through earphones. Results were submitted to an analysis of covariance and discussed in terms of the interaction between and effects of distraction, shock threat and task difference on performance. T. I. R 11

13,246

Bilodeau, E. A., Bilodeau, Ina McD. & Schumsky, D. A. SOME EFFECTS OF INTRODUCING AND WITHDRAWING KNOWLEDGE OF RESULTS EARLY AND LATE IN PRACTICE. *J. exp. Psychol.*, Aug. 1959, 58(2), 142-144. (Tulane University, New Orleans, La.).

To investigate effects of introduction and withdrawal of knowledge of results (KR) early and late in practice on learning, 160 male subjects performed on 24 trials at a lever-displacement task. KR was the amount and direction of reported error. Data were analyzed in terms of mean absolute error and results were considered in terms of applicability to Hull's (I_R) theory. G. R 4

13,247

DeWolfe, Ruthanne K. S. & Duncan, C. P. TIME ESTIMATION AS A FUNCTION OF LEVEL OF BEHAVIOR OF SUCCESSIVE TASKS. *J. exp. Psychol.*, Aug. 1959, 58(2), 153-158. (Northwestern University, Evanston, Ill.).

To determine the effect of level of task related behavior on time estimation, 135 subjects made 15 time estimates each by working on a standard task for a fixed time interval and working for the period of time (on a comparison task) which the subject felt equalled the time spent on the standard task. Three tasks—rest, reversed alphabet printing, and anagram solving—were used in all combinations as both standard and comparison tasks. These tasks represented, respectively, low, intermediate, and high

"Levels of Behavior." Data were analyzed by means of analysis of variance. T. G. R 9

13, 248

Howell, W. C. & Briggs, G. E. THE EFFECTS OF VISUAL NOISE AND LOCUS OF PERTURBATION ON TRACKING PERFORMANCE. *J. exp. Psychol.*, Aug. 1959, 58(2), 166-173. (Ohio State University, Columbus, Ohio).

To determine the effects of visual noise and locus of perturbation of tracking performance, 24 subjects each tracked (on a five-inch cathode ray tube) four consecutive 65-second trials under 28 combinations of visual noise magnitude (four levels including a noise-free condition), locus of perturbation (four loci), and input complexity (two levels). Noise signals had a peak of 30 cycles per minute with a two-octave bandwidth. Data are analyzed by means of the analysis of variance. Results are discussed in terms of performance as a function of visually coded response feedback versus input information. T. G. R 8

13, 249

Stevens, J. C. & Mack, J. D. SCALES OF APPARENT FORCE. *J. exp. Psychol.*, Nov. 1959, 58(5), 405-413. (Harvard University, Cambridge, Mass.).

This study was designed to explore the functional relations between the subjective magnitude and the physical magnitude of mechanical forces by: 1) obtaining a ratio scale for apparent magnitude of a force exerted by an observer (0) on a hand dynamometer, 2) obtaining a ratio scale for force applied to 0's hand, 3) comparing 1 and 2 by having 0 match the force in 2 on the dynamometer, 4) comparing subjective scale for force and subjective scale for lifted weights. To avoid bias, magnitude estimation, magnitude, ratio, and category production were employed. For each procedure, several 0s made a fairly large number of judgments of the kind appropriate to that scale. The scales of apparent force thus constructed were compared and discussed in terms of the generality of the power function. T. G. I. R 7

13, 250

Jones, A. THE EFFICIENCY OF UTILIZATION OF VISUAL INFORMATION AND THE EFFECTS OF STRESS. *J. exp. Psychol.*, Dec. 1959, 58(6), 428-432. (University of Pittsburgh, Pittsburgh, Penn.).

To determine the effect of variations in intensity of stress on efficiency of utilization of visual information, 37 male subjects were asked to identify various simple forms, each reproduced in a series of 17 ascending levels of information. Recognition thresholds were determined as a function of varying degrees of subject shock expectation. Results are plotted and the data submitted to analysis of

variance. Implications of the findings for further investigation of information processing in visual perception are considered. T. G. I. R 7

13, 251

Stevens, J. C. & Shickman, G. M. THE PERCEPTION OF REPETITION RATE. *J. exp. Psychol.*, Dec. 1959, 58(6), 433-440. (Harvard University, Cambridge, Mass.).

To determine the effects of intensity, rate of stimulus and sense modality on perception of repetition, 109 observers made subjective estimates of frequency of: 1) periodic flashes of light, 2) bursts of noise, 3) clicks, 4) tactual pulses on the fingertip, and 5) electric pulses applied across the fingers, by methods of fractionation and magnitude estimation. Curves of repetition estimations for the various sense modalities were compared as a function of rate of stimulus repetition (signals/second). Results were discussed in terms of just-noticeable differences and ratio scale. G. I. R 11

13, 252

White, C. T. & Cheatham, P. G. TEMPORAL NUMEROSITY: IV. A COMPARISON OF THE MAJOR SENSES. *J. exp. Psychol.*, Dec. 1959, 58(6), 441-444. (USN Electronics Lab., San Diego, Calif. & USN Office of Naval Research, Washington, D. C.).

To investigate the perceived number of vibratory stimuli as a function of the number presented for rates of 10 per second and 30 per second, five subjects made 200 judgments each of the number of vibratory stimuli presented (under the thumbnail). Visual perception of number when the eye was adapted to a high light level was also investigated. Results were compared with previous work on vision and audition, and discussed in terms of physiological hypothesis. T. G. R 5

13, 253

Lit, A. THE EFFECT OF FIXATION CONDITIONS ON DEPTH DISCRIMINATION THRESHOLDS AT SCOTOPIC AND PHOTOPIC ILLUMINANCE LEVELS. *J. exp. Psychol.*, Dec. 1959, 58(6), 476-481. (University of Michigan, Ann Arbor, Mich.).

To determine the effects of different methods of fixation on precision of depth discrimination, as a function of varying levels of equal illumination (to both eyes), two subjects performed at least 60 equality settings (in a two-rod test apparatus involving real-depth cues) for each of 14 levels of illumination which were repeated for the following methods of fixation: 1) steady fixation on the movable comparison rod, 2) steady fixation on the immovable standard rod, and 3) fixation on either of

the rods at the subject's discretion. Depth discrimination threshold curves were plotted for all three methods of fixation as a function of illumination level. Results are discussed in terms of chemical postulates and related to other studies. T. G. R 8

13,254

Lehiste, Ilse & Peterson, G. E. LINGUISTIC CONSIDERATIONS IN THE STUDY OF SPEECH INTELLIGIBILITY. *J. acoust. Soc. Amer.*, March 1959, 31(3), 280-286. (University of Michigan, Ann Arbor, Mich.).

This is an attempt to define intelligibility as a basic aspect of the communication process by taking account of the linguistic facility of both the speaker and listener. Toward this end the dialect intelligibility ratio was described and defined. Essential considerations for the construction of intelligibility test materials were discussed. The Harvard Phonetically-Balanced word lists were analyzed for phonetic balance vs. phonemic balance. CNC lists of phonemically balanced monosyllables also were constructed. T. R 3

13,255

Wright, H. N. AUDITORY ADAPTATION IN NOISE. *J. acoust. Soc. Amer.*, July 1959, 31(7), 1004-1012. (Northwestern University, Evanston, Ill.).

To describe the initial rate, extent, and recovery from auditory adaptation to tones of 250, 1000, and 4000 cps measured both in the presence and absence of noise, ten experienced listeners participated in an experimental session consisting of: establishment of the unadapted level of the experimental ear, seven minutes of stimulation, determination of adaptation and recovery. The method of fixed intensities was used; the stimulus to the control ear was presented dichotically in phase with the sustained stimulus to the experimental ear for 15 seconds at one-minute intervals, the subject varied the level in his control earphone until the fused sound appeared in the median plane. Adaptation was determined for two conditions where only the tone was present and five where tone and noise were present. T. G. 1. R 7

13,256

Miskolczy-Fodor, F. RELATION BETWEEN LOUDNESS AND DURATION OF TONAL PULSES. 1. RESPONSE OF NORMAL EARS TO PURE TONES LONGER THAN CLICK-PITCH THRESHOLD. *J. acoust. Soc. Amer.*, Aug. 1959, 31(8), 1128-1134. (New York Eye and Ear Infirmary, New York, N. Y.).

To examine the relationship between loudness sensation and pulse duration: 1)

threshold intensity as a function of selected pulse duration was studied monaurally (40 subjects) for frequencies of 250, 1000, and 4000 cps; and 2) at selected suprathreshold levels, intensity was held constant as pulse duration was gradually increased for 20 subjects (141 measurements). Discussion concerns: 1) the duration-intensity relationship as a function of frequency, 2) the relationship between time threshold and loudness in sones, and 3) a comparison between monaural and binaural time threshold. T. G. R 26

13,257

Pollack, I. & Trittipoe, W. J. BINAURAL LISTENING AND INTERAURAL NOISE CROSS CORRELATION. *J. acoust. Soc. Amer.*, Sept. 1959, 31(9), 1250-1252. (USAF Operational Applications Lab., Bolling AFB, Washington, D. C.).

To study the effect of noise level, duration, and filtering on identification of interaural correlations obtained from bursts of wide-band noise, six subjects made a total of at least 5600 identifications under the following conditions: correlated bursts of wide-band noise at 1) 30-90 db, 2) 10-1000 milliseconds, and 3) 0.2-4.0 kilocycles per second (filtered). Also studied was the interaural cross-correlation necessary for correct identification in 75 percent of the trials. Effects of polarity and of the experimental procedure on identification of interaural noise correlations were discussed. G. R 9

13,258

Ehmer, R. H. MASKING BY TONES VS NOISE BANDS. *J. acoust. Soc. Amer.*, Sept. 1959, 31(9), 1253-1256. (USN Medical Research Lab., New London, Conn.).

To compare the masking effects of pure tones versus noise, thresholds and masked thresholds were obtained from two listeners with normal hearing; masking stimuli were pure tones at 500, 1000, 2000 and 4000 cps (at 60 and 80 db sensation level) versus one-third octave bands of noise of equal intensities and centered at the same frequencies. Results were discussed in terms of the cochlear mechanisms of masking. G. R 7

13,259

Pickett, J. M. LOW-FREQUENCY NOISE AND METHODS FOR CALCULATING SPEECH INTELLIGIBILITY. *J. acoust. Soc. Amer.*, Sept. 1959, 31(9), 1259-1263. (USAF Operational Applications Lab., Applications Research Branch, AFRC, Bedford, Mass.).

To explore the effects on speech intelligibility of adding low-frequency bands of a free-field noise, four trained listeners scored for reception, on a checklist, sets

of 25 words to which were added low-frequency bands at frequencies ranging from 20-600 cps and noise levels ranging from 73-115 db. Direct low-frequency masking was measured as well as any upward spread of masking to higher frequencies. Implications for calculating the effects of noise interference upon intelligibility are discussed. G. R 13

13, 260

Woodhead, Muriel M. EFFECT OF BRIEF LOUD NOISE ON DECISION MAKING. *J. acoust. Soc. Amer.*, Oct. 1959, 31(10), 1329-1331. (Applied Psychology Research Unit, MRC, Cambridge, England).

To determine the effect of brief loud noise on decision-making, two experiments (and one control) were performed utilizing 48 subjects. In experiment I, 18 subjects were administered 15 bursts (lasting 0.95 second) or recorded rocket noise (110 db. pressure) while performing at the Mackworth multichannel test. In experiment II, 18 subjects were administered three single blasts each (0.95 second in duration) of the rocket noise to determine effects of variations in intensity of the rocket noise on decision-making. Intensities were 85, 95, and 115 db. Results were discussed and a critical threshold for the effect of noise burst intensity on performance is considered. T. G. R 10

13, 262

Kryter, K.D. SCALING HUMAN REACTIONS TO THE SOUND FROM AIRCRAFT. *J. acoust. Soc. Amer.*, Nov. 1959, 31(11), 1415-1429. (Bolt Beranek and Newman Inc., Cambridge, Mass.).

To determine the "annoying" characteristics of commercial jet aircraft (to persons on the ground) in comparison with commercial reciprocating-engine aircraft, 136 subjects compared recorded sounds from six jet aircraft with sounds from two reciprocating-engine aircraft in a series of three experiments utilizing the following methods of comparison: 1) for indoor listening, the method of individual adjustment; 2) for indoor listening, the method of paired comparison; and 3) for outdoor listening, the method of individual adjustment. Criteria were discussed for calculating subjective reactions to noise, in terms of speech interference level, equal listener response loudness level, overall sound pressure, etc. Indoor and outdoor listening were compared as were age and sex differences. T. G. I. R 14

13, 263

Green, D. M., McKey, Mary J. & Licklider, J. C. R. DETECTION OF A PULSED SINUSOID IN NOISE AS A FUNCTION OF FREQUENCY. *J. acoust. Soc. Amer.*, Nov. 1959, 31(11), 1446-1452. (Massachusetts Institute of Technology, Cambridge, Mass. & Bolt Beranek and Newman, Inc., Cambridge, Mass.).

To determine the effect of frequency versus signal energy on 1) the detectability of single pulsed sinusoids (0.1 second in duration) and 2) the detectability of compound pulsed sinusoids of the same duration, 11 subjects made 500 judgments of detectability for each of 16 single frequencies (250-4000 cps) and each of 16 compound frequencies. Results were discussed in terms of other data and in terms of the independent-threshold "model" of signal detection.

13, 264

Pollack, I. MESSAGE UNCERTAINTY AND MESSAGE RECEPTION. *J. acoust. Soc. Amer.*, Nov. 1959, 31(11), 1500-1508. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

To determine the effect of message uncertainty vs. response uncertainty on accuracy of reception of masked messages, nine experiments were performed using experienced subjects. Words were wired electrically with white noise (110-6500 cps) at a level of 80 db. above threshold. Investigated were possible contributing factors such as the parameters of message vs. response uncertainty as well as irrelevant alternatives; response uncertainty vs. response diversity; listener strategy; confidence ratings and conceptual operations; categorization vs. representation; relation to signal detectability theory, and measure of response discriminability. Results are related to information theory. T. G. R 24

13, 266

Harris, C.M. RESIDUAL MASKING AT LOW FREQUENCIES. *J. acoust. Soc. Amer.*, Aug. 1959, 31(8), 1110-1115. (Columbia University, New York, N.Y.).

To investigate "residual masking" (the temporary shift in the threshold of hearing following cessation of a masking source) as a function of loudness density vs. frequency, curves of residual masking vs. frequency were obtained for 250 cps. masking tones at sound pressure levels of 90 and 110 db. These masking patterns were obtained 150 and 200 milliseconds after cessation of the masking tone. Also, residual masking was measured as a function of intensity level of a "white noise" masking source. Plots of loudness density versus frequency were obtained from residual

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masking patterns, and loudness of the pure-tone masking source was evaluated. T. G. I. R 14

13, 267

Ehmer, R.H. MASKING PATTERNS OF TONES. J. acoust. Soc. Amer., Aug. 1959, 31(8), 1115-1120. (USN Medical Research Lab., New London, Conn.).

To determine the relative effects of aural harmonics and cochlear spread of masking tone activity on the extension of masking to frequencies above the masking tone, monaural masking patterns were obtained from three listeners for pure tones (spaced by octaves) from 250-8000 cps. (at 20-100 db. above threshold). Results are discussed in terms of 1) the activity pattern of the masking tone in the cochlea, 2) beats between signal and masking tones, 3) aural harmonics, and 4) suppression of cochlear response to the signal. G. R 18

13, 268

Solomon, L.N. SEMANTIC RE-ACTIONS TO SYSTEMATICALLY VARIED SOUNDS. J. acoust. Soc. Amer., July 1959, 31(7), 986-990. (USN Electronics Lab., San Diego, Calif.).

This is an attempt "to clarify the role of beat rate and accent, as they interact with spectrum, in the phenomenological clustering of passive sonar sounds in terms of psychological similarity." Artificially produced complex sounds were employed. These were varied systematically in spectrum, in amplitude modulation at several beat rates, and in terms of presence or absence of accent within a group of four beats. Every combination of all parameters (21 sounds) was rated by 20 naive subjects on the seven psychological dimensions of sound that had been previously isolated by factor analysis. Analysis of the resultant clusters of sounds indicated the influence of the three variables examined. T. G. R 3

13, 269

Wishart, D.M.G. A QUEUEING SYSTEM WITH SERVICE-TIME DISTRIBUTION OF MIXED CHI-SQUARED TYPE. Operat. Res., March-April 1959, 7(2), 174-179. (University of Birmingham, Birmingham, England).

This paper applies Kendall's technique of the embedded Markov chain to a queueing system with general independent input and a wide class of service-time distributions. First, the equilibrium distribution of waiting-times was derived, then the results applied to a queueing system of Bailey. R 9

13, 270

Roberts, J.O. (Chm.). MAKING THE AIRCRAFT EASIER TO SEE. Soc. exp. test Pilots, Winter 1959, III(2), 5-6. (North American Aviation, Inc., Los Angeles, Calif.).

This symposium on aircraft safety points up some of the factors which lead to mid-air collisions. One paper presents the statistics on this type of accident and proposes some systems for improving the situation. Another paper reviews some work in this area which involved primarily flight testing to determine fundamental design requirements for daytime conspicuity devices and for proximity warning devices. A third paper describes the advantages of the Minneapolis-Honeywell-Atkins Anti-Collision Light System. A few other short papers discussed the problem from the pilot's standpoint. A final paper discussed the air-space and air traffic control aspect of the problem. I. R 5

13, 271

Tymczyszyn, J.J. (Chm.). IMPROVING COCKPIT VISIBILITY FROM PRESENT AND PROPOSED AIRCRAFT. Soc. exp. test Pilots, Winter 1959, III(2), 52-53. (Civil Aeronautics Administration, Washington, D.C.).

This symposium session includes papers on the following topics, all relating to the air safety problem: 1) visibility aids to alleviate cockpit and human limitations, 2) the cockpit visibility problem in supersonic jet transport type aircraft, and 3) the optical quality of future aircraft transparent enclosures. G. I. R 12

13, 272

Young, H. (Chm.). INSURING VIGILANCE FROM PRESCRIBED CREW STATIONS. Soc. exp. test Pilots, Winter 1959, III(2), 95-98. (Douglas Aircraft Co., El Segundo, Calif.).

This symposium session deals with the subject of vigilance from crew stations, and points up ways in which crews may perform a better job. The papers include: 1) the human element in mid-air collisions, 2) the Navy's view on crew vigilance, 3) the pilot's view of cockpit vigilance, 4) the airline management's view of cockpit vigilance, and 5) the amount one can see assuming perfect vigilance. G. I.

13, 273

Kilgariff, T.G. THE TREND IN ESCAPE FROM HIGH PERFORMANCE AIRCRAFT. Soc. exp. test Pilots, Summer 1959, I(1), 31-44.

This is an investigation of the history of escape from high performance aircraft in an effort to determine the controlling parameter for successful escape. The successful

IV 92

13, 274

escape sequence is delineated and its relation to the design of the escape system and of the flight equipment is indicated. The recommendations which are set forth point out the need for basic research on the limits of human tolerance in this situation, and for well controlled laboratory and flight testing of the equipments. G. R 19

13, 274

Le Vier, T. PILOTS' VIEWPOINT ON EMERGENCY ESCAPE. Soc. exp. test Pilots, Spring 1959, III(3), 3-9. (Lockheed Aircraft Corporation, Burbank, Calif.).

This article emphasizes the need for adequate emergency escape systems for pilots of modern high performance aircraft. The large discrepancy between advances in aircraft and those in escape systems is elaborated and illustrated.

13, 275

Holcomb, G. A. & Cahill, W. F. NORTH AMERICAN ZERO LEVEL ESCAPE SYSTEM. Soc. exp. test Pilots, Spring 1959, III(3), 10-18.

The North American complete flight envelope escape system is described and illustrated in detail. Some data from sled-simulated aircraft testing are included. I.

13, 276

Mohrlock, H. F. "THIS WAY OUT, PLEASE" (AN EJECTION SEAT FOR SUPERSONIC AND LOW ALTITUDE ESCAPE). Soc. exp. test Pilots, Spring 1959, III(3), 19-32. (Convair, San Diego, Calif.).

This report discusses the problems to be solved in designing a successful ejection seat for supersonic and low altitude escape. Some of these include: 1) the time element between ejection and ground contact, 2) the height of seat trajectory in order to allow sufficient time for parachute deployment and sufficient height for fin clearance, 3) the aerodynamic stability of the seat, and 4) the windblast encountered upon ejection. The seat that was designed is described and illustrated. Sled test data from the seat and human tolerance data are discussed in terms of successful escape requirements. G. 1.

13, 277

Johnson, J. C. DRUGS AND THE FLYER. Soc. exp. test Pilots, Spring 1959, III(3), 38-40.

This is a brief account of some of the more common drugs which are used frequently in self-medication by pilots, and of the reasons they can be dangerous to the pilot. Included in this group are: 1) antihistamines, 2) antibiotics, 3) alcohol, 4) caffeine products, 5) barbiturates, and 6) tranquilizers.

13, 278

Lovelace, W. R. II & Crossfield, A. S. BIOMEDICAL ASPECTS OF ORBITAL FLIGHT. Soc. exp. test Pilots, Spring 1959, III(3), 41-56. (Lovelace Foundation, Albuquerque, N. M. & North American Aviation, Inc., Los Angeles, Calif.).

This article discusses the biomedical aspects of the orbiting flight problem. The three types of manned orbital vehicles are described in terms of their potential use in biomedical research. Seven phases of orbit mission are delineated and the biomedical problem areas in each are examined. Four stages of performance degradation are indicated for use as guides to the tolerance that must be built in to obtain an adequate level of functioning of man in the respective phases. T. 1.

13, 279

Hopkins, H. Z., Jr., Harer, R. J. & Hoskins, G. W. (Chm.). PROFESSIONAL PILOTS' SYMPOSIUM ON AIR SPACE SAFETY SUMMARY REPORT INTRODUCTORY REMARKS. Soc. exp. test Pilots, Fall 1958, III(1), 11-20.

This report summarizes the symposium sessions on air space safety. The following problems were investigated: 1) means of making the aircraft more visible, 2) means of improving cockpit visibility from present and proposed aircraft, 3) methods of improving vigilance from prescribed crew stations, and 4) means of modernizing airways. General recommendations were also presented.

13, 280

Van Bergeijk, W. A. & David, E. E., Jr. DELAYED HANDWRITING. Percept. mot. Skills, Dec. 1959, 9(4), 347-357. (Bell Telephone Laboratories, Inc., Murray Hill, N. J.).

These two experiments were designed to test one's ability to write words when there is a delay inserted between the act of writing and the appearance of the script. Subjects, after practicing with the stylus until they felt ready, wrote each of 12 words under the following delays: 0, 40, 80, 150, 270, and 520 milliseconds. Time to complete word was one measure, neatness rating was the other. In the second experiment, the effect of speed instructions was determined (in the first, subjects were instructed simply to do their best), everything else remained the same. New subjects were used. The same two measures of performance plus error scores were used. (There were no errors in Experiment 1.) The results are discussed briefly as they relate to visual monitoring. T. G. 1. 2

13,281

Eason, R.G. THE SURFACE ELECTROMYOGRAPH (EMG) GAUGES SUBJECTIVE EFFORT. *Percept. mot. Skills*, Dec. 1959, 9(4), 359-361. (USN Electronics Lab., San Diego, Calif.).

This study investigated the hypothesis that the surface EMG reflects the amount of effort required to maintain voluntarily a sustained contraction. Twelve male subjects participated. Four experimental conditions were tested: 1) with no visual or auditory information the subject attempted to hold effort constant, 2) while monitoring a meter that displayed EMG activity, subject attempted to hold constant the EMG from biceps, 3) same as 2) but EMG was from forearm flexor, and 4) while monitoring a meter which registered force subject attempted to hold it constant. In all cases, the subject was maintaining a 30-lb. pull on a dynamometer for a two-minute period. G. R 2

13,282

Deutsch, J.A. THE KOEHLER-WALLACH THEORY AND THE AFTER-EFFECT OF SEEN MOVEMENT. *Percept. mot. Skills*, Dec. 1959, 9(4), 393-394. (Oxford University, Oxford, England).

This brief note is a critique of H.H. Spitz's explanation of the after-effect of seen movement in terms of Koehler's theory of figural after-effects. R 2

13,283

Schlosberg, H. & Kling, J.W. THE RELATIONSHIP BETWEEN "TENSION" AND EFFICIENCY. *Percept. mot. Skills*, Dec. 1959, 9(4), 395-397. (Brown University, Providence, R.I.).

This brief report presents a summary of recent data on the relation between level of activation and efficiency of performance. Possible reasons for the discrepancy in results are noted. R 5

13,284

Green, R.F. ACCURACY OF THE BISECTION OF ANGULAR EXTENTS WITH CONTROL KNOBS AS FUNCTIONS OF DIRECTION OF FINAL MOVEMENT AND NUMBER OF SETTINGS. *Engng. Industr. Psychol.*, Fall 1959, 1(3), 67-82. (University of Rochester, Rochester, N.Y.).

This study investigated the accuracy of bisecting various angular extents by means of a control knob as a function of the direction of the final setting movement and the effect on accuracy of repeated bisections of the same angular extent. Ninety-six males participated. The experimental conditions were: final movement left, 80 degrees; R-80 degrees; L-40 degrees; R-40 degrees; L-120 degrees; R-120 degrees. Fifty-two

settings were made by each subject. Analysis of variance was performed; the main variables were directions, angles, and subjects. T.G. R 5

13,285

Hodge, D.C. & Blair, W.C. IMPROVED RIFLE SIGHTS FOR HIGH AND LOW ILLUMINATION LEVELS. *Engng. Industr. Psychol.*, Fall 1959, 1(3), 91-94. (University of Rochester, Rochester, N.Y. & General Dynamics Corporation, Groton, Conn.).

Seven experimental sights were compared with the M1 rifle sights in order to determine which would produce the least error under both high and low illumination. Eighty subjects were tested under both 50 footcandles and one footcandle of illumination. The experimental design was a two by eight factorial with five subjects per cell. Aiming error was measured by the diagonal method. The data were analyzed by analysis of variance, sights and illumination being the main effects. T. R 6

13,286

Black, G. & Proschan, F. ON OPTIMAL REDUNDANCY. *Operat. Res.*, Sept.-Oct. 1959, 7(5), 581-588. (Sylvania Electric Products, Inc., Mountain View, Calif.).

This paper develops a general mathematical solution to the problem in which a complex system is placed in the field for a fixed period, during which time only the spare parts initially provided may be used. The solution based on the assumption that component failures follow exponential distributions is in terms of the composition of a spare parts kit which maximizes assurance of continued operation during the fixed period. An illustration of this solution is included. In addition, the manner in which nonexponential life distributions may be computed is indicated. R 14

13,287

Blachman, N. & Proschan, F. OPTIMUM SEARCH FOR OBJECTS HAVING UNKNOWN ARRIVAL TIMES. *Operat. Res.*, Sept.-Oct. 1959, 7(5), 625-638. (Sylvania Electric Products, Inc., Mountain View, Calif.).

In this paper the mathematical solution is developed for a search problem in which the arrival times for objects is in accordance with a Poisson distribution. Thus, the problem is to arrange the optimum pattern of search, taking into account: 1) the a priori probability of arrival in each region, 2) the probability of detection as a function of region, 3) the length of time required to scan each region, 4) the gain (or loss) after detection as a function of arrival time, etc.

The range of application of the model thus developed extends from missile detection to checking of rapid-turnover personnel. Several cases are solved. R 4

Brooks, S. H. A COMPARISON OF MAXIMUM-SEEKING METHODS. *Operat. Res.*, July-Aug. 1959, 7(4), 430-457. (General Analysis Corporation, Los Angeles, Calif.).

This paper compared several methods: factorial designs, univariate procedures, methods of steepest ascent, and random experimentation, for making estimates of the optimal combination of factors. Experimental situations were specified by: response surface (four were used), experimental error, experimental region (nine were randomly selected from each surface), and number of trials (16 or 30). The achievement among methods is compared, achievement being the magnitude of response at the estimate. T. G. I. R 12

Gluss, B. AN OPTIMUM POLICY FOR DETECTING A FAULT IN A COMPLEX SYSTEM. *Operat. Res.*, July-Aug. 1959, 7(4), 468-477. (Armour Research Foundation of Illinois Institute of Technology, Chicago, Ill.)

For optimally detecting the breakdown in a complex system and then repairing it, two models are considered and their equations developed. This optimum policy minimizes the expected amount of time consumed or penalties paid. Model I assumes that overall tests of each module may be performed as well as individual item tests within modules; Model II that overall module tests are not possible and that penalty costs must be paid when search moves from one module to another. An example is worked out for Model I. T. R 2

Michael, D. N. THE SOCIAL ENVIRONMENT. *Operat. Res.*, July-Aug. 1959, 7(4), 506-523. (Dunlap and Associates, Inc., Stamford, Conn.).

This paper discusses "the social environment and its implications where the role of humans is important for operations research and the related techniques of systems analysis and human engineering." Those processes and agencies of the social environment which determine what a man does with his abilities and how well or poorly he does it are presented in terms of: the individual, the culture in which he lives, the social groups with which he is associated, and the "institutional" world. The manner in which the social environment operates in man-machine systems, traditional and advanced, is examined. R 12

Clark, D. F. & Ackoff, R. L. A REPORT ON SOME ORGANIZATIONAL EXPERIMENTS. *Operat. Res.*, May-June 1959, 7(3), 279-293. (Case Institute of Technology, Cleveland, Ohio).

The ultimate objective of the research here reported is to develop mathematical theory for explaining the effect of organizational structure on the efficiency of organizational performance. The method developed uses an organizational analog in the form of an operational game. Several experiments are described in which the following variables are examined: presence or absence of an executive, availability of communication channels, and cooperativeness or competitiveness of payoffs. I. R 7

Saaty, T. L. COEFFICIENT PERTURBATION OF A CONSTRAINED EXTREMUM. *Operat. Res.*, May-June 1959, 7(3), 294-302. (Booz, Allen Applied Research, Inc., Bethesda, Md.).

To minimize total cost a schedule is given for allocating labor to different tasks when labor is a variable function of time. The problem was cast in linear-programming form, all coefficients parameterized. This method is illustrated and its uses and limitations discussed. R 9

Chacko, G. K. AN OPERATIONS-RESEARCH EVALUATION TECHNIQUE OF THE USE OF SALES-RESEARCH INFORMATION. *Operat. Res.*, May-June 1959, 7(3), 313-321. (Royal Metal Manufacturing Company, New York, N. Y.).

The information requirements of sales organizations are discussed. A working hypothesis about the use of such data in decision-making was found necessary in this problem of the optimum structure of information for a multi-plant, multi-product organization. Limitations in defining such a model are the paths from raw data to research information and from this to decision-making and finally to "change in sales." The benefit from this approach is already being felt at Royal Metal Manufacturing where the research is only in the raw data to research information phase. R 4

Coe, J. C. TRAFFIC ANALYSIS OF SMALL TELEPHONE SWITCHBOARDS. *Operat. Res.*, May-June 1959, 7(3), 347-361. (USA Electronic Proving Ground, Sierra Vista, Ariz.).

Some fundamental traffic considerations of small telephone switchboards are examined. In particular, those with 12 subscribers or less, and with conversations of one to six

47 95

minutes' duration were analyzed. A number of results were obtained which indicate: 1) load conditions under which a second operator improves service, 2) conditions under which operator or line is a limiting factor, 3) conditions under which subscribers receive poor service, etc. The determination of some traffic parameters are quantified. T. G. 1.

13, 295

Curtin, K. M. A 'MONTE CARLO' APPROACH TO EVALUATE MULTIMODED SYSTEM RELIABILITY. *Operat. Res.*, Nov. - Dec. 1959, 7(6), 721-727. (Arma Div., American Bosch Arma Corporation, Garden City, N. Y.).

A 'Monte Carlo' technique is used to predict and evaluate multimoded system reliability. The multimoded system is defined and an example detailed. The Monte Carlo method of analysis is then described and applied to the example. T. R. 2

13, 296

Behnke, A. R., Guttentag, O. E. & Brodsky, C. QUANTIFICATION OF BODY WEIGHT AND CONFIGURATION FROM ANTHROPOMETRIC MEASUREMENTS. *Hum. Biol.*, Sept. 1959, 31(3), 213-234. (USN Radiological Defense Lab., San Francisco, Calif. & University of California Medical Center, San Francisco, Calif.).

In this study seven anthropometric measurements (bideitoid diameter, chest, biceps, forearm, buttocks, thigh and calf circumferences) obtained on 31 Navy men were summated for the calculation of body weights. Waist, ankle, wrist and knee circumferences also obtained from the group were used in partitional anthropometric analyses. In addition body fat was estimated by the helium dilution chamber technique. Constants were then derived for estimating surface area of the body, as well as weight. Similar anthropometric data on women were compared to those of the men, and relationships are indicated. Data from other groups were also compared. T. G. 1. R. 17

13, 297

Cipwynyk, D. EFFECT OF DEGREE OF ILLUMINATION ON RATE OF AMBIGUOUS FIGURE REVERSAL. *Canad. J. Psychol.*, Sept. 1959, 13(3), 169-174.

This study investigated the effect of illumination on the rate of ambiguous figure reversal. Twelve naive subjects viewed a Necker cube for two minutes under dim, medium, and bright illumination conditions. The number of reversals was recorded for each ten-second period of the two-minute observation. Analyses of variance were carried out for the 30-, 60-, 90-, and 120-second performance periods. The findings are discussed in terms of both number and rate of reversals. T. R. 20

13, 298

Belles, R. C., Hulicka, Irene M. & Ilanly, Barbara. COLOUR JUDGMENT AS A FUNCTION OF STIMULUS CONDITIONS AND MEMORY COLOUR. *Canad. J. Psychol.*, Sept. 1959, 13(3), 175-185. (University of Pennsylvania,

Philadelphia, Penn. & University of Oklahoma, Norman, Okla.).

To demonstrate that an observer will make a color match, if permitted, regardless of possible memory color influences, 20 subjects learned the "color names" of six pairs of nonsense figures; half were the colors indicated and half were actually gray. The subjects then made color matches for each figure by successive presentation method. Variability of color judgments is indicated. In a second experiment, 32 naive subjects made color matches between several pairs of figures which differed in physical dimension and in implied memory color--leaf, square, donkey, nonsense figure--, under match-possible and match-impossible conditions. Color-matching errors were subjected to an analysis of variance. The role of associative and sensory factors in perception of color is discussed. R. 12

13, 299

Scott, T. H., Bexton, W. H., Heron, W. & Doane, B. K. COGNITIVE EFFECTS OF PERCEPTUAL ISOLATION. *Canad. J. Psychol.*, Sept. 1959, 13(3), 200-209. (McGill University, Montreal, Canada).

This is a systematic investigation of the effects of perceptual isolation on cognitive function. Male subjects (29) were placed in isolation for as long as they would stay (three to four days). Before, during, and after isolation they were given two batteries of tests which consisted of arithmetic problems, number series completion, word making and anagrams, Koh's blocks, Wechsler digit-symbol, McGill Picture Anomaly test, etc. They were also subjected to propaganda during the isolation period. Control subjects (27), not isolated, were given the tests and propaganda material. Differences in the error scores between the experimental and control groups were analyzed and p-values determined. The effects of propaganda on the scores on attitude scales were assessed by t-tests. T. G. R. 4

13, 300

Doane, B. K., Mahatoo, W., Heron, W. & Scott, T. H. CHANGES IN PERCEPTUAL FUNCTION AFTER ISOLATION. *Canad. J. Psychol.*, Sept. 1959, 13(3), 210-219. (McGill University, Montreal, Canada).

This study investigated the changes in visual perception after four days of isolation. In addition, spatial orientation and somaesthetic perception were studied. Male subjects (17) composed the experimental group; 13 were confined to a cubicle, 4 underwent only visual isolation. Visual, spatial and somaesthetic tests were administered to the control group (20 subjects) at the same time intervals as for the experimental group: before testing, after 48 and 72 hours of isolation, and after the completed period of isolation. Visual perception tests included: critical flicker frequency, figural after-effect, size constancy, etc. Tests of somaesthetic function were tactual form-discrimination and two-point limen. Spatial orientation was tested by requiring movements in certain directions without vision. T. R. 10

13, 302

Crawford, B. H. MEASUREMENT OF COLOR RENDERING TOLERANCES. *J. opt. Soc. Amer.*, Dec. 1959, 49(12), 1147-1156. (National Physical Laboratory, Teddington, Middlesex, England).

To determine the degree of variation which can be tolerated in different bands of the spectrum of an illuminant, color rendering tolerances were measured by direct experiment using several levels of illumination and a variety of test objects. The criterion was a "just noticeable difference from the standard when judged by memory only." The general procedure was the gradual, continuous alteration of the spectral composition of the illuminant until the observer judges the object as looking different than it did initially. Tolerances for six contiguous spectral bands of comparable weight in color rendering were measured for several types of illuminants with such objects as pictures, colored surfaces, etc. A method for the assessment of color-rendering properties is presented and discussed. T. G. R 2

13, 303

MacAdam, D. L. SMALL-FIELD CHROMATICITY DISCRIMINATION. *J. opt. Soc. Amer.*, Dec. 1959, 49(12), 1143-1146. (Eastman Kodak Company, Rochester, N. Y.).

Color discrimination data for 11 chromaticities were determined by a single observer using a matching method which consisted of adjusting the luminance and chromaticity (amount of red, green, and blue) of one stimulus until it matched a standard stimulus of the same size. Two sizes of stimuli were tested: three minutes and 4.4 degrees. Thirty matches were made for each chromaticity at each size. The data (amounts of red, green, and blue) were subjected to an analysis of variance and metric coefficients were determined. The results are presented graphically as discrimination ellipses on CIE diagrams for the luminance values studied for both field sizes. The use of these data for evaluating the large chromaticity differences encountered in color graininess is discussed. T. G. R 11

13, 305

Knoll, H. A. RESEARCH TILTING HAPLOSCOPE. *J. opt. Soc. Amer.*, Dec. 1959, 49(12), 1176-1179. (Bausch & Lomb Optical Company, Rochester, N. Y.).

This article describes the design and construction of a tilting haploscope, including both optical and mechanical features. The method of positioning the observer's head is also detailed. Preliminary measurements of phorias and fusional convergence were made at several tilt and elevation angles on each of five observers. 1. R 5

13, 307

Boynton, R. M., Kandel, G. & Onley, Judith W. RAPID CHROMATIC ADAPTATION OF NORMAL AND DICHROMATIC OBSERVERS. *J. opt. Soc. Amer.*, July 1959, 49(7), 654-665. (University of Rochester, Rochester, N. Y.).

Forty spectral sensitivity curves were obtained on three observers--normal, deuteranope, protanope--for blue, green, red, and yellow adapting stimuli at brightnesses ranging from 0.8 to 80 millilamberts, thresholds being taken at 10 millimicron (mu) intervals from 400 to 700 mu. The test stimulus (one-degree diameter) and adapting stimulus (five degrees) appeared in the following manner: adapting stimulus (0.3 sec.)--darkness (0.05 sec.)--test stimulus (0.033 sec.)--darkness (1.7 sec.)--sequence repeated. Both 3- and 4-curve fits were made to the data, which were interpreted in terms of 3- vs. 4-receptor models of the underlying mechanisms in cone vision. T. G. R 13

13, 308

Sweeney, E. J. EFFECT OF THE TEST STIMULUS ON THE MEASUREMENT OF DARK ADAPTATION. *J. opt. Soc. Amer.*, July 1959, 49(7), 667-668. (USN Medical Research Lab., New London, Conn.).

The effect of intensity of the test stimulus on the course of dark adaptation was systematically explored so as to determine the allowable upper limit. A Becht-Schlaer Adaptometer was used. The test stimulus, two degrees in diameter, was centered 10 degrees from fixation. A ten-degree flashing stimulus, one-fifth second in duration, concentric to test stimulus, was presented once a second for 90 seconds at a brightness ranging from 3.6 to 10.6 log micromicrolamberts. Forty minutes dark adaptation preceded testing of two observers. Thresholds were obtained for the entire course of dark adaptation, then the flashing stimulus procedure was instituted. Results are discussed in terms of sensitivity tolerance. T. G. R 2

13, 310

DeMott, D. W. DIRECT MEASURES OF THE RETINAL IMAGE. *J. opt. Soc. Amer.*, June 1959, 49(6), 571-579. (University of Rochester, Rochester, N. Y.).

Several experiments are described in which empirical data on the characteristics of the retinal image were obtained. The main apparatus consists of an eye holder with accessories, a microilluminometer and acuity targets (3 seconds to 3.35 minutes). Details in the handling of the excised fresh steer eyes and in the experimental procedures are presented. The effects of pupil diameter and of chromatic aberration on the sharpness of the image were determined as well as the effect of acuity target width. Other experiments studied the effects of: 1) the optical

system, 2) the post mortem age of the eyes, and 3) the use of contact lens. The conflict between these and other data and theoretical calculations of the retinal image are discussed in terms of entoptic stray light and minimum resolvable black line. G. I. R 12

13, 311

Jackson, J. E. SOME MULTIVARIATE STATISTICAL TECHNIQUES USED IN COLOR MATCHING DATA. *J. opt. Soc. Amer.*, June 1959, 49(6), 585-592. (Eastman Kodak Company, Rochester, N. Y.).

This article summarizes some of the basic multivariate significance tests which have been used to evaluate color matching data. The need for multivariate-type analysis of these data is discussed. Several such tests are described and illustrated with actual color matching data: 1) sample means vs. hypothetical means, 2) two sample means, 3) k sample means, 4) sample covariance matrix vs. hypothetical covariance matrix, 5) two-sample covariance matrices, 6) homogeneity of variance for k groups, 7) test for shapes of covariance matrices of unequal volume. T. G. R 26 approx.

13, 312

Koomen, M. J. VISIBILITY OF STARS AT HIGH ALTITUDE IN DAYLIGHT. *J. opt. Soc. Amer.*, June 1959, 49(6), 626-629. (USN Research Lab., Washington, D. C.).

The distribution of luminance over the sky at 100,000 feet for solar elevations of 10, 40, and 80 degrees was calculated and the daylight visibility of stars under these conditions was predicted from visual threshold data. The calculations were based on 1) theoretical values obtained using the Raleigh law of light scattering which had been subject to empirically determined corrections and 2) photometric measurements made from a stratosphere balloon plus barometric pressure information. The determinations of star visibility were based on relation between background luminance and threshold intensity when search is not necessary. Further estimates of visibility using a ten-power telescope are included. G. R 14

13, 313

Sharp, H. C. EFFECT OF SUBLIMINAL CUES ON TEST RESULTS. *J. appl. Psychol.*, Dec. 1959, 43(6), 369-371. (Utah State University, Salt Lake City, Utah).

This study is concerned with the effect of subliminal cues on test results. The cues were correct answers or alternate correct and incorrect answers presented for 1/200 second at seven-second intervals such that each answer was superimposed upon its test item three times. The test was constructed from material in their elementary psychology tests. Sixty-two subjects took the test; one group was presented the correct

cues, the other the alternate correct and incorrect cues. Mean scores for the two groups were compared. These are discussed in light of other related research and factors are suggested to account for them. T. R 10

13, 314

Rambo, W. W. THE EFFECTS OF PARTIAL PAIRING ON SCALE VALUES DERIVED FROM THE METHOD OF PAIRED COMPARISONS. *J. appl. Psychol.*, Dec. 1959, 43(6), 379-381. (Oklahoma State University, Norman, Okla.).

The relationship between scale values computed from complete and partial pairings was determined when the rating task as well as the number of observations was permitted to vary with the reduction in the number of pairs. Sixty subjects were divided into six groups; each group received a different partial pairing schedule. The test materials were 30 nationality group names presented in pairs. The subject selected one of each pair according to a criterion. One complete and five partial pairing schedules were used. Pearson correlation coefficients provided an estimate of the degree of association between scale values for all pairing schedules. These were then compared by t tests. T. R 5

13, 315

Champion, J. M. & Turner, W. W. AN EXPERIMENTAL INVESTIGATION OF SUBLIMINAL PERCEPTION. *J. appl. Psychol.*, Dec. 1959, 43(6), 382-384. (Georgia State College of Business, Savannah, Ga. & General Motors Institute, Detroit, Mich.).

The influence of a subliminal visual stimulus on subsequent recognition of the stimulus and association with its name was studied. A 30-minute film was presented to two groups of subject; one group was also presented the experimental stimulus (meaningful object with brand name) at .01 second duration at ten-second intervals throughout the experiment. The other group was presented the control stimulus (few nonsense lines on black background) in the same manner. Following the film, a questionnaire to determine the subliminal effects was given to the subjects. Chi-square technique was used to evaluate the difference in the questionnaire scores between the two groups. T. R 2

13, 316

Lykken, D. T. THE GSR IN THE DETECTION OF GUILT. *J. appl. Psychol.*, Dec. 1959, 43(6), 385-388. (University of Minnesota, Minneapolis, Minn.).

Forty-nine subjects were divided into four groups--one enacted a mock murder and theft crime, one enacted the murder, one enacted the theft, and the fourth was exposed to neither crime. All were given a guilty

knowledge test composed of six standard questions relating to each of the two crimes. The galvanic skin response was used throughout. From these responses subjects were classified into their original four groups. R 3

13, 317

Simon, J.R. & Simon, Betty P. DURATION OF MOVEMENTS IN A DIAL SETTING TASK AS A FUNCTION OF THE PRECISION OF MANIPULATION. *J. appl. Psychol.*, Dec. 1959, 43(6), 389-394. (State University of Iowa, Iowa City, Iowa).

In this study the precision required to adjust each of two dials on a simplified control panel was systematically varied in order to gain information on human manual movements. Subjects (24) performed on each of four experimental conditions: 1) gross manipulation of both dials, 2) fine manipulation of left one, gross manipulation of right, 3) gross manipulation of left, fine manipulation of right, and 4) fine manipulation of both. Performance measures were: time for adjustment of each dial and travel time between dials. Analysis of variance was performed on these parts of the control movement for each experimental condition. T. I. R 9

13, 318

Rothe, H.F. & Nye, C.T. OUTPUT RATES AMONG MACHINE OPERATORS: II. CONSISTENCY RELATED TO METHODS OF PAY. *J. appl. Psychol.*, Dec. 1959, 43(6), 417-420. (Fairbanks, Morse and Company, Beloit, Wisc.).

This report presents and compares weekly output rates for machine operators paid according to an incentive system over a ten-week period. Both individual and group comparisons were made and some correlations were determined for successive week's output. These findings were discussed in terms of the effectiveness of the method of pay and related to findings obtained for other methods. T. R 4

13, 319

Whittenburg, J.A., Ross, S. & Andrews, T.G. EFFECTS OF ALTERING TASK COMPONENTS ON PERCEPTUAL-MOTOR TASK LEARNING. *J. appl. Psychol.*, Aug. 1959, 43(4), 226-234. (University of Maryland, Baltimore, Md.).

The effects of altering different display-control relationships of a compensatory tracking task on acquisition and retention of the task were determined. Three display-control characteristics were investigated: directional, rate of change and differential torque, at both early and later learning stages. There were 12 subjects for each of nine conditions: eight experimental — four early and four late learning—

and one standard. The primary measure of performance was time on target. Analyses of covariance were performed. The findings were discussed as they relate to the operational characteristics of the task. T. G. R 16

13, 320

Byrne, D. THE EFFECT OF A SUBLIMINAL FOOD STIMULUS ON VERBAL RESPONSES. *J. appl. Psychol.*, Aug. 1959, 43(4), 249-252. (San Francisco State College, San Francisco, Calif.).

This is an attempt to isolate and study a few of the variables involved in behavior influenced by subliminal stimulation. The subliminal stimulus was a food word. One hundred and five subjects were divided into experimental and control groups. The experimental group saw a movie with the food word superimposed in flashes of 1/200 second every seven seconds; control group just saw the movie. A brief inventory was administered following the movie on which subjects rated their hunger, completed sentences, indicated time they last ate, etc. Analysis of variance and chi square techniques were employed to test the hypotheses. T. R 15

13, 321

Riggs, L.A. & Tulunay, S.U. VISUAL EFFECTS OF VARYING THE EXTENT OF COMPENSATION FOR EYE MOVEMENTS. *J. opt. Soc. Amer.*, Aug. 1959, 49(8), 741-745. (Brown University, Providence, R.I.).

The relationship between the degree of stabilization of the retinal image and the extent of seeing a test object was studied. The test object, one degree in diameter, was a bipartite field of various luminance ratios 4.16, 2.00, 1.63, and 11.25. Two observers reported the time during which they were able to see the vertical line separating the semicircles of the target. Viewing periods were 39 seconds, rest periods, 21 seconds. The relative error of image stabilization was varied from -0.26 to 1.15 for each luminance ratio. These data provided information on the comparative effects of image motion and contrast on the maintenance of vision. The present data were related to previous work in terms of the physical characteristics of the retinal image and the physiological basis for seeing with image motion. T. G. I. R 10

13, 322

Battersby, W.S. & Wagman, I.H. NEURAL LIMITATIONS OF VISUAL EXCITABILITY. I. THE TIME COURSE OF MONOCULAR LIGHT ADAPTATION. *J. opt. Soc. Amer.*, Aug. 1959, 49(8), 752-759. (Mount Sinai Hospital, New York, N.Y.).

Investigation of the visual excitability changes during the course of light adaptation was aimed at distinguishing the role of neural activity from that of photochemical. The viewing situation consisted of: 1) 20-degree adapting field, 1 mL constant, 2) three-degree conditioning flash, 1, 10, or 100 mL for 5, 50, or 500 msec., and 3) 40-minute test flash, 5 msec. The conditioning and test stimuli were presented concentrically at seven degrees of arc in the temporal half-field. Intervals between these stimuli ranged from -200 msec. (test stimulus before) to +1500 msec. (test stimulus after). From the obtained thresholds of two trained observers an approximation of the photochemical contribution was made and the neural effect estimated. Some neural mechanisms are postulated. G. 1.

13, 323

Kelsey, Patricia A. & Schwartz, Ira. NATURE OF THE LIMIT OF THE COLOR ZONE IN PERIMETRY. *J. opt. Soc. Amer.*, Aug. 1959, 49(8), 764-769. (USN Medical Research Lab., New London, Conn.).

To "best" determine the shape of the gradient of the blue and yellow outer color zones, thresholds were measured by: 1) constant stimuli, 2) method of limits, and 3) clinical one-directional series. The stimulus, one degree presented for one sec., was placed in discrete steps at every two degrees along the lower vertical meridian. Four intensities of each stimulus were tested: blue, 2.35, 2.10, 2.04, and 2.00 ft-L; yellow, 11.25, 4.86, 2.92, and 2.32 ft-L. The surround was constant at 2.0 ft-L. Adaptation to the surround brightness (15 minutes) preceded each session (four subjects). The ranges and standard deviations of thresholds are indicated for each technique. Correlations between observers as well as between intensities for a given observer were computed. Technique reliability is discussed. T. G. R 9

13, 324

Rawcliffe, R.D., Lichtenberger, W.W. & Krone, H.V. OPTICAL SIMULATION OF RADAR RESOLUTION. *J. opt. Soc. Amer.*, Sept. 1959, 49(9), 887-890. (University of Illinois, Urbana, Ill.).

This report presents a technique for simulating radar displays in order to evaluate simply and inexpensively the resolution required for target detectability on a given equipment. The optical system and masks used to degrade the simulated materials, aerial photographs, by known amounts are described and illustrated. Some important differences between these photographs and a radar photograph are noted. 1. R 2

13, 325

Jameson, Dorothea & Hurvich, L.M. PERCEIVED COLOR AND ITS DEPENDENCE ON FOCAL, SURROUNDING, AND PRECEDING STIMULUS VARIABLES. *J. opt. Soc. Amer.*, Sept. 1959, 49(9), 890-898. (New York University, New York, N.Y.).

Alternative formal definitions of perceived color are presented and discussed in terms of overall predictive value. The importance of induction effects is thus established. An exploratory study is reported in which sensory scaling techniques were used to obtain quantitative estimates of color attribute functions and changes in these functions for the same test stimuli with different adaptation and surround conditions. Test stimuli were narrow spectral bands, two degrees by ten degrees or two degrees by one degree, presented for about one second in a 37 degree circular surround. Hue, saturation and brightness estimates were obtained. The neural and photochemical mechanisms are discussed. G. R 24

13, 326

Ogilvie, J.C. & Taylor, M.M. EFFECT OF LENGTH ON THE VISIBILITY OF A FINE LINE. *J. opt. Soc. Amer.*, Sept. 1959, 49(9), 898-900. (Defence Research Medical Labs., Toronto, Ontario, Canada).

The threshold visibility of a series of targets which ranged from a fine dark line to a square and which were presented in both a vertical and oblique orientation were determined. The viewing situation consisted of: 1) 1.25 degree circular area with luminance of 250 ft-L, 2) 1.25 degree annulus with luminance of 200 ft-L, 3) remaining visual field with luminance of 180 ft-L. Five subjects participated. Percentage visibility values found on some of the data were transformed to probits. The 50 per cent threshold values are plotted for angular area of test object as a function of angular width. T. G. R 8

13, 327

Nachmias, J. TWO-DIMENSIONAL MOTION OF THE RETINAL IMAGE DURING MONOCULAR FIXATION. *J. opt. Soc. Amer.*, Sept. 1959, 49(9), 901-908. (Swarthmore College, Swarthmore, Penn.).

Two-dimensional relative motion of the retinal image along eight meridians was studied by means of trigonometric transformations of the vertical and horizontal components of eye movements. Recordings were obtained by a modification of the optical lever technique which provided simultaneous vertical and horizontal records that were independent and uncontaminated. Two subjects were

used. Two types of movement were measured: 1) sudden shifts or saccades, and 2) drifts. Results are discussed in terms of: 1) relationship between saccadic and drift movement, 2) latency of saccades, 3) position of the eye during fixation and movement. T. G. 1. R 10

13, 328

Newshall, S.M., Burnham, R.W. & Evans, R.M. INFLUENCE OF SHADOW QUALITY ON COLOR APPEARANCE. *J. opt. Soc. Amer.*, Sept. 1959, 49(9), 909-917. (Eastman Kodak Company, Rochester, N.Y.).

The effect of a shadow of zenith skylight quality upon the color appearance of various test samples was determined, and compared to that obtained under a daylight quality shadow. The test sample appeared in the left aperture and the colorimeter in the right. Four lighting conditions of the test sample were tested: 1) illuminated surround of 13.5 ft-L, 2) daylight shadow of 2.5 ft-L, 3) skylight shadow of 2.5 ft-L, and 4) half illuminated and half skylight shadow. Three observers participated. All color appearance matches are presented as Munsell rennotations. T. G. 1. R 4

13, 329

Sperling, H.G. & Lewis, W.G. SOME COMPARISONS BETWEEN FOVEAL SPECTRAL SENSITIVITY DATA OBTAINED AT HIGH BRIGHTNESS AND ABSOLUTE THRESHOLD. *J. opt. Soc. Amer.*, Oct. 1959, 49(10), 983-989. (USN Medical Research Lab., New London, Conn.).

This study provides information on: 1) relationship between high brightness and threshold luminosity functions, 2) description of humps and dips in spectral sensitivity functions which will allow for a theoretical synthesis in terms of underlying functions, and 3) relationship between combined color mixture functions in luminance units and the luminosity function based on different methods of measurement. Foveal spectral sensitivity was measured at 28 wavelengths at ten mu intervals from 410 to 690 by: 1) absolute thresholds using 2-degree and 45-minute stimuli, 2) flicker photometry, and 3) heterochromatic brightness matching. Appropriate adaptation periods preceded testing. T. G. R 19

13, 330

Shurcliff, W.A. NEW VISUAL PHENOMENON: THE GREENISH-YELLOW BLOTCH. *J. opt. Soc. Amer.*, Nov. 1959, 49(11), 1041-1048. (Polaroid Corporation, Cambridge, Mass.).

This report describes a new phenomenon of color vision: an observer viewing a uniform physical field suddenly sees his perceptual field break up into areas, pattern,

and background that are very different in color. The experimental findings presented are qualitative; they are descriptions of the spectral compositions of the fields, and classification of the patterns. The latter category includes findings on the range of sizes, shapes, colors, and durations of the patterns and exploration of time-delay, sequence, and repetition effects. From an analysis of these observations, a simple model of the proposed mechanisms is derived. T. 1. R 1

13, 331

Evans, R.M. FLUORESCENCE AND GRAY CONTENT OF SURFACE COLORS. *J. opt. Soc. Amer.*, Nov. 1959, 49(11), 1049-1059. (Eastman Kodak Company, Rochester, N.Y.).

This is an investigation of the colors in the Munsell 5R plane using the ordinary surface colors and colors produced in a small aperture in a large white illuminated surround. With surface colors, four observers made four sets of observations each on white, gray, and black backgrounds by selecting samples according to each of four series: 1) constant chroma, 2) constant saturation, 3) constant contrast with the background, and 4) constant gray content. With aperture colors the observers made observations for four loci: 1) same gray content threshold, 2) zero gray or fluorescence threshold, 3) brightness match threshold, and 4) illuminant mode threshold. The results suggested several hypotheses which were further explored experimentally. T. G. 1. R 11

13, 332

Hanes, R.M. & Rhoades, M.V. COLOR IDENTIFICATION AS A FUNCTION OF EXTENDED PRACTICE. *J. opt. Soc. Amer.*, Nov. 1959, 49(11), 1060-1064. (Applied Physics Lab., Johns Hopkins University, Silver Spring, Md.).

To determine whether or not substantial improvement in color identification could be obtained with extended practice, one observer studied color chips in the Munsell 21-Chart Student Set for several hours each day for about five months, and underwent two-hour test sessions once a week during this period. The observer selected the method of study and the initial set of colors. Subsequently, the test session results were the basis for deleting hues as well as adding them. Upon completion of the five-month period, three additional test sessions were administered, one a week later, one a month later, and one about three and one-half months later. Number and kind of errors are presented. The results are discussed and compared to other recent findings on color memory. T. G. 1. R 2

13, 333

Silverman, R.E. THE COMPARATIVE EFFECTIVENESS OF ANIMATED AND STATIC TRANSPARENCIES. *J. appl. Psychol.*, Feb. 1959, 43(1), 16-20. (New York University, New York, N.Y.).

To evaluate the relative training effectiveness of animated versus static transparencies, 150 male students were first trained with three devices each differing in the number of moving parts; then they were tested on three types of tests each differing in the amount of performance as compared to verbal components. The training devices were: pistol, carbine, and rifle. Means and standard deviations of the error scores were obtained for each of the three tests and analyses of variance were performed. T. R 2

13, 334

Uhr, L. SEX AS A DETERMINANT OF DRIVING SKILLS: WOMEN DRIVERS! *J. appl. Psychol.*, Feb. 1959, 43(1), p. 35. (University of Michigan, Ann Arbor, Mich.).

This is a very brief statistical treatment by chi square technique of judgments of auto driver's behavior as dangerous or safe in 25 incidents. The major variable was sex of the subject. T. R 4

13, 335

Kamenetzky, J. CONTRAST AND CONVERGENCE EFFECTS IN RATINGS OF FOODS. *J. appl. Psychol.*, Feb. 1959, 43(1), 47-52. (USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.).

Several assumptions were set forth as to the rating of foods as poor or good and predictions were then made as to how these ratings would be influenced by the order in which the foods were judged. Four groups of 40 subjects rated each of four samples, presented in one of four orders, on a nine-point scale. An analysis of variance of these preference ratings was performed for each of the four sets of data. The results are discussed in terms of convergence and contrast effects. T. R 2

13, 336

Thomas, D.D. ELECTRONIC AIR TRAFFIC CONTROL. *Systems*, July-Aug. 1959, XXIII(4), 4-5. (Federal Aviation Agency, Washington, D.C.).

This brief article discusses the Federal Aviation Agency's first step in its program for establishing a nationwide network of computers that will aid in air traffic control. This step was the installation of the electronic computer in the high density traffic routes of the Northeast. The major jobs performed by the computers are indicated. 1.

13, 337

Graham, Elaine & Landis, C. EFFECTS OF STRIATED FIELDS ON CRITICAL FLICKER FREQUENCY. *J. opt. Soc. Amer.*, June 1959, 49(6), 580-585.

This is an attempt to study systematically the effect of striated fields upon the critical flicker frequency (cff). The test stimulus, 8.5 degrees on a side, contained gratings which subtended 0.63, 0.21, 0.07 and 0.025 degree. Retinal illuminance was varied over about six log trolands (5.02 to -0.48 log trolands). Two subjects were employed. Two sets of monocular cff thresholds were obtained with each grating for each brightness. The findings are compared to those obtained by other researchers, in terms of patterned versus unpatterned fields. T. G. R 20

13, 338

Duncan, C.P. RECENT RESEARCH ON HUMAN PROBLEM SOLVING. *Psychol. Bull.*, Nov. 1959, 56(6), 397-429. (Northwestern University, Evanston, Ill.).

This review of most of the human problem solving studies published in the period 1946 through 1957 is composed of the following sections: definitions; independent variables that influence this behavior, e.g. transfer following different methods and amounts of training, variations within the problem itself, individual difference variables; problem solving processes; theory; and conclusions (representing the author's summary analysis of the literature). R 114

13, 339

Mayo, S.T. TOWARD STRENGTHENING THE CONTINGENCY TABLE AS A STATISTICAL METHOD. *Psychol. Bull.*, Nov. 1959, 56(6), 461-470. (Loyola University, Chicago, Ill.).

This paper describes briefly some contingency techniques and demonstrates the manner in which they overcame problems which have limited the usefulness of the contingency method. The problems and their accompanying solutions which are considered here include small samples, indices of relationship, specification of hypotheses, higher-order interactions, and computational procedures. The benefits accrued from these techniques are cited for the present as well as future analyses. R 45

13, 340

Glanzer, M. & Glaser, R. TECHNIQUES FOR THE STUDY OF GROUP STRUCTURE AND BEHAVIOR: I. ANALYSIS OF STRUCTURE. *Psychol. Bull.*, Sept. 1959, 56(5), 317-332. (American Institute for Research, Pittsburgh, Penn. & University of Pittsburgh, Pittsburgh, Penn.).

This paper examines the work on structure of groups or teams with emphasis on communication structure. The following

techniques for simplifying and analyzing the complex data generated by groups are presented: 1) indices for group and individual characteristics, e.g. index of concentration, hierarchy index, status index, 2) enumeration of structures, e.g. distribution of subgroup configurations, 3) comparison of groups, e.g. comparison of matrices using cell entries, 4) analysis of subgroups, e.g. diagonal maximization method, 5) assignment of individuals to subgroups, 6) other approaches: graph theory, logic of relations. T. R 47

Myers, J.L. ON THE INTERACTION OF TWO SCALED VARIABLES. *Psychol. Bull.*, Sept. 1959, 56(5), 384-391. (University of Massachusetts, Amherst, Mass.).

This paper presents a "complete analysis of the (a-1)(b-1) degrees of freedom involved in the interaction of two independent, scaled variables, A and B." The aim is to extend present understanding of the interaction term and to introduce a method which will permit inferences about rate of change of slope and curvature coefficients. The analysis is carried out with data from a five by three factorial with four entries in each of 15 cells. This technique may be used to describe a number of relationships, some of which are cited. T. R 3

Gaito, J. MULTIPLE COMPARISONS ON ANALYSIS OF VARIANCE. *Psychol. Bull.*, Sept. 1959, 56(5), 392-393. (Wilkes College, Wilkes-Barre, Penn.).

Several examples of partitioning the n degrees of freedom for the main effect into n orthogonal components, each with one degree of freedom, are presented. This procedure enables one to make multiple comparisons in analysis of variance after rejection of the null hypothesis. R 5

Triandis, H.C. A CRITIQUE AND EXPERIMENTAL DESIGN FOR THE STUDY OF THE RELATIONSHIP BETWEEN PRODUCTIVITY AND JOB SATISFACTION. *Psychol. Bull.*, July 1959, 56(4), 309-312. (University of Illinois, Urbana, Ill.).

This paper points up the inadequacy of current methods for studying the relationship between output and job satisfaction via a brief analysis of the findings in the literature. A procedure for such a study is developed and described; it includes three phases: 1) obtaining norms for output and satisfaction for a given job, 2) showing each worker on the output-satisfaction graph to obtain group working at optimum, 3) comparing others against the optimum group. G. R 11

Campbell, D.T. & Fiske, D.W. CONVERGENT AND DISCRIMINANT VALIDATION BY THE MULTITRAIT-MULTIMETHOD MATRIX. *Psychol. Bull.*, March 1959, 56(2), 81-105. (Northwestern University, Evanston, Ill. & University of Chicago, Chicago, Ill.).

A validation process is suggested which utilizes a matrix of intercorrelations among tests representing at least two traits, each measured by at least two methods. Those aspects of validity emphasized in the process include: 1) evidence of convergent validity by independent measurement procedures, 2) evidence of discriminant validity or minimum correlations with tests which are supposed to differ, 3) evidence of higher relations between independent measures of the same trait than between measures of different traits, 4) evidence of same pattern of trait interrelationship in all heterotrait triangles of mono- and heteromethod blocks of the matrix. Other multitrait-multimethod matrices are discussed in terms of the four criteria, and the problems in achieving these are considered. T. R 36

Haggard, E.A., Chapman, Jean P., Isaacs, K.S. & Dickman, K.W. INTRAClass CORRELATION VS. FACTOR ANALYTIC TECHNIQUES FOR DETERMINING GROUPS OF PROFILES. *Psychol. Bull.*, Jan. 1959, 56(1), 48-57. (University of Illinois, Urbana, Ill.).

This study examined and compared several methods for determining profiles of groups, mainly for the condition when a criterion for grouping already exists. The data used here were 12 Minnesota Multiphasic Personality Inventory profiles obtained in a clinic setting. The procedure consisted of two distinct approaches: factor analytic and direct correlation. The findings thus obtained were considered under four topics: 1) what natural groupings exist among the profiles, 2) what aspects of the profiles should be considered in forming groups, 3) what types of criterion profiles may be used in forming groups, and 4) how can one determine the group membership of individual profiles. T. R 6

Cliff, N. ADVERBS AS MULTIPLIERS. *Psychol. Rev.*, Jan. 1959, 66(1), 27-44. (Princeton University, Princeton, N.J.).

To determine whether the common adverbs of degree, e.g. very, slightly, quite, multiply the intensity of the adjectives they modify, three groups of subjects rated the combinations of nine intensive adverbs with 15 evaluative adjectives on an 11-point scale

from most unfavorable through neutral to most favorable, and they also made paired comparison judgments on a sample of the same stimuli. The method of successive intervals was used to determine the scale values of each adverb-adjective combination. A matrix method was employed to analyze the data. The findings are discussed and compared to other relevant research, e.g. Stevens, Jones and Thurstone, Osgood. Directions for further research are indicated. T. R 16

13, 347

Wertheimer, M. ON DISCRIMINATION EXPERIMENTS. 1. TWO LOGICAL STRUCTURES. *Psychol. Rev.*, July 1959, 66(4), 252-266. (New School for Social Research, New York, N.Y.).

Two different logical structures are set forth as a basis for understanding learning to respond correctly in discrimination experiments. The essential factors in the first one are the differences between each of the members of the test pair and each of the training stimuli, i.e. the correct response occurs on the basis of recognition of absolute qualities. The important factors in the second one are the relations within the test and training pair, i.e. the position in relational structures. The factors which favor absolute over relational reactions are discussed in terms of the two structures. Finally, the ability of the relational structure to handle also the absolute is considered.

1. R 6

13, 349

Bindra, D. STIMULUS CHANGE, REACTIONS TO NOVELTY, AND RESPONSE DECREMENT. *Psychol. Rev.*, March 1959, 66(2), 96-103. (McGill University, Montreal, Canada).

This paper suggests how "novelty" in the test situation may determine response decrement and develops a basis for predicting the effects of a stimulus change by specifying the nature and determinants of 'novelty reactions.' Essentially an additional proposition is proposed beyond Estes' and Bush and Mosteller's mathematical formulation of Guthrie's common-element model. This is 'any change in stimulus elements from the training to the test situation produces response decrement because, and to the extent that, the novelty provided by the altered stimulus elements evokes interfering reactions to novelty.' Three empirically testable implications of this formulation are worked out in detail. R 20

13, 350

Foley, P.J. THE FOREPERIOD AND SIMPLE REACTION TIME. *Canad. J. Psychol.*, March 1959, 13(1), 20-22. (Defence Research Medical Labs., Toronto, Ontario, Canada).

This experiment investigated the relation between the ready signal and the optimum duration of the foreperiod in simple reaction time. Eight subjects responded to the onset of the stimulus light by pressing a key. There were twenty presentations for each of nine conditions. The duration of the ready signal, the time between cessation of ready signal and onset of stimulus and the total time, i.e. the addition of these two intervals, were varied. The combinations of these values made up the nine conditions. Mean reaction times were obtained, and an analysis of variance was carried out. T. R 3

13, 351

Churchill, A.V. A COMPARISON OF FACTUAL AND VISUAL INTERPOLATION. *Canad. J. Psychol.*, March 1959, 13(1), 23-27. (Defence Research Medical Labs., Toronto, Ontario, Canada).

This experiment investigated the effect of the visual vs. tactual sense modality on scale interpolation. The scale consisted of 11 rods ranging from one-half to one and one-eighth inch in diameter, in one-sixteen inch increments. The one-half inch rod was 'zero' and the one and one-eighth inch rod 'ten'; they were 12 inches apart. Ten subjects estimated the unit position within the interval (nine intervals) represented by each of nine rods, each presented six times in a random series of 54 presentations. These judgments were made by both modalities, the equipment appropriately modified for each. Interpolation errors were scored in terms of magnitude and frequency. Chi square was used for analyzing the under- and overestimation categories. G. R 1

13, 352

Thornton, G.B. EMG CHANGES IN A RETROACTION EXPERIMENT USING A PERCEPTUAL MOTOR TASK. *Canad. J. Psychol.*, March 1959, 13(1), 49-58. (University of Toronto, Toronto, Ontario, Canada).

This investigation was aimed at determining whether muscle tension varies systematically with practice on a two-hand tracking task and with the successive acquisition of competing response tendencies. Fifty males, divided into five groups, performed the Two-Hand Coordinator motor task, each with different intervening activity between the original learning and relearning phase, e.g., rest, reversed task, additional trials on original task. Electromyograph was measured from the forearm during all practice periods, as well as time-on-target. Covariance analysis was performed on the between-groups differences of the time-on-target means, and on the mean electromyograph scores between original and relearning. T. G. R 20

13, 353

Powesland, P. F. THE EFFECT OF PRACTICE UPON THE PERCEPTION OF CAUSALITY. *Canad. J. Psychol.*, Sept. 1959, 13(3), 155-168. (Queen's University, Kingston, Ontario, Canada).

To study the effects of practice upon the perception of causality 40 subjects in eight groups judged the causality of a bar falling because a post was removed after practice with different intervals of delay between the above two events (0.0 to 1.0 seconds). These judgments were then made during a random series of delays, after each group received different kinds and amounts of interpolated practice, and again during a random series of delays. In a second experiment 48 subjects in five groups judged whether or not one object's movement caused the other's. Similar practice, test, interpolated treatments, and post-test procedures were used. In all cases temporal thresholds of causality were obtained. The Kruskal-Wallis One-Way Analysis of Variance, the Walsh Test, etc. were used to analyze the data. T. R 11

13, 354

Bousfield, W. A., Berkowitz, H. & Whitmarsh, G. A. ASSOCIATIVE CLUSTERING IN THE RECALL OF MINIMALLY MEANINGFUL GEOMETRIC DESIGNS. *Canad. J. Psychol.*, Dec. 1959, 13(4), 281-287. (University of Connecticut, Storrs, Conn.).

The development of associative clustering was studied using four categories of minimally meaningful and simple geometric designs, a total of 24 designs. Twenty-five undergraduates participated. The subject drew each stimulus as it was presented; after the final item he began his first recall. There were five successive recall sequences. Seven types of scores were obtained, e.g., number of items correctly recalled, number of irrelevant intrusions. A split-plot design was used. The data were analyzed by analysis of variance technique. The applicability of this technique for studying concept formation was discussed. T. 1. R 6

13, 355

Haire, M. PSYCHOLOGICAL PROBLEMS RELEVANT TO BUSINESS AND INDUSTRY. *Psychol. Bull.*, May 1959, 56(3), 169-194. (University of California, Los Angeles, Calif.).

The conceptual history of psychology in industry is discussed as seen within its three separate traditions: personnel, human engineering, and industrial social. Several major points are considered: in personnel, the problems of selection such as identification of multiple criteria and their combination and weighting; in human engineering, the

problems associated with kinds and sources of error in man-machine systems; in industrial social, the problems of large group organization as well as the small group, and the basic problems of motivation and communication. In all areas, the directions for future research are discussed, e.g., training assessment, risk-taking and decision theory, organization theory, etc. R 96 (approx.)

13, 356

Maxwell, A. E. STATISTICAL METHODS IN FACTOR ANALYSIS. *Psychol. Bull.*, May 1959, 56(3), 228-235. (University of London, London, England).

This article reviews some large sample statistical methods which are of value to factor analysis. Included are: test for the significance of a correlation matrix, tests for the significance of a residual matrix, methods for estimating the standard errors of factor loadings. These tests are critically discussed and an approach in the search for psychologically meaningful factors is recommended. T. R 44

13, 357

Bovard, E. W. THE EFFECTS OF SOCIAL STIMULI ON THE RESPONSE TO STRESS. *Psychol. Rev.*, Sept. 1959, 66(5), 267-277. (Montreal Neurological Institute, Montreal, Quebec, Canada).

This paper discusses the effects of present social experience on the response to stress. The literature concerning effects of stress (physiological and psychological) on the organism, especially as it relates to the pituitary-adrenal response was reviewed first. Studies suggesting that social stimuli dampen the response to stress were reviewed next. The usefulness of measures of activity of the sympathetic division as well as the pituitary-adrenal cortical response as an index of response to stress was pointed out. Implications of the hypothesis that social stimuli dampen response to stress for fields "as widely different as psychotherapy and interplanetary exploration" were pointed out. R 43

13, 358

Bourne, I. E., Jr. & Restle, F. MATHEMATICAL THEORY OF CONCEPT IDENTIFICATION. *Psychol. Rev.*, Sept. 1959, 66(5), 278-296. (University of Utah, Salt Lake City, Utah & Michigan State University, East Lansing, Mich.).

This paper reports an attempt to "extend a theory of discriminative learning so as to analyze the process of identifying concepts. "This was accomplished by a) theoretical analysis of animal and human learning in simple discrimination problems, and b) use of the procedures of concept-identification. The theory employed states that "discrimination learning involves two processes--conditioning relevant cues and adapting irrelevant cues." In the experiments reported, such stimulus dimensions as color, size, shape, number position

were varied. The theory was used next in mathematical form, and to mediate quantitative predictions. T. G. R 15

13, 359

Smith, A. A. THE GEOMETRY OF VISUAL SPACE. *Psychol. Rev.*, Sept. 1959, 66(5), 334-337. (Defence Research Medical Labs., Toronto, Ontario, Canada).

This brief paper gives an analysis of visual space perception in which "only stimuli consisting entirely of isolated point-sources in otherwise dark surroundings" were considered. The probability dispersion of points in the visual field was considered, and led to an expression for the uncertainty of the scale of measurement. R 5

13, 360

Rock, I. & Ebenholtz, S. THE RELATIONAL DETERMINATION OF PERCEIVED SIZE. *Psychol. Rev.*, Nov. 1959, 66(6), 387-401. (New School for Social Research, New York, N. Y.).

To test the hypothesis that perceptual qualities often are determined by relational rather than by absolute characteristics of the stimulus, a series of experiments were performed to investigate the extent to which phenomenal size is relationally determined, the role which distance plays, and the combined effects of these variables on size constancy. I. R 9

13, 361

Jerison, H. J. EFFECTS OF NOISE ON HUMAN PERFORMANCE. *J. appl. Psychol.*, April 1959, 43(2), 96-101. (Antioch College, Yellow Springs, Ohio).

Three experiments were performed to determine the effects of noise on nonauditory performance: vigilance, mental counting, and time judgment tasks. Noise levels used were approximately 80 db. for "quiet" and 110 db. for "noise". Vigilance was measured via a clock-watching task, time judgments via estimation of the passage of ten-minute intervals, mental counting via keeping separate counts of three flashing lights. The findings were analyzed by analysis of variance or t tests, and discussed in terms of psychological stress. T. G. I. R 16

13, 362

Torrance, E. P. AN EXPERIMENTAL EVALUATION OF "NO-PRESSURE" INFLUENCE. *J. appl. Psychol.*, April 1959, 43(2), 109-113. (University of Minnesota, Minneapolis, Minn.).

This study was aimed at assessing the relative effectiveness of six degrees of pressure exerted by instructors in indoctrinating aircrewmembers for an emergency ration. One control and six experimental groups were formed; 427 men were assigned

to these. The pressure ranged from none through information, group explanation to the greatest evaluation. Subjects were given the emergency ration for use during the simulated survival experience. Criteria of acceptance and measures of perceived instructor pressure were then obtained. Chi squares were performed on the data. T. R 4

13, 363

Wakeley, J. H. QUANTIFICATION OF THE TERM "OBJECTIONABLE" AS APPLIED TO COLORANTS IN NATURAL WATERWAYS. *J. appl. Psychol.*, April 1959, 43(2), 137-140. (North Carolina State College, Raleigh, N. C.).

To determine a method for giving quantitative meaning to the term "objectionable" as it applies to colored wastes in streams, 20 subjects observed a simulated natural stream as it was gradually changed by the addition of each of six colorants: red, orange, yellow, green, blue, violet, and indicated when it became objectionable. A color-difference formula was used to obtain scores for each colorant. The distribution of these scores was determined and scores were determined which would be objectionable to fewer than five per cent of the population. T. I. R 6

13, 364

Groth, Hilde & Lyman, J. EFFECTS OF MASSED PRACTICE AND THICKNESS OF HANDCOVERINGS ON MANIPULATION WITH GLOVES. *J. appl. Psychol.*, June 1959, 43(3), 154-161. (University of California, Los Angeles, Calif.).

This study examined the effects of thickness of selected handcovering materials on three criterion measures of manipulatory skill. Subjects were 24 male undergraduates divided into four groups. The task, a self-paced one, was placement of a cylinder in a recess on a control board which corresponded in location to a light in the display matrix. Prehension force, number of transports, and time per transport were recorded at three-minute intervals. Four handcovering conditions, one per group, cotton glove, leather glove, Arctic mitten, bare hand were tested. The data were analyzed by analyses of variance technique. T. G. R 14

13, 365

Winick, C. ART WORK VERSUS PHOTOGRAPHY: AN EXPERIMENTAL STUDY. *J. appl. Psychol.*, June 1959, 43(3), 180-182. (Columbia University, New York, N. Y.).

The effectiveness of art work vs. photography for advertising purposes was studied. Four paired advertisements, one a photograph and one using art work, were

13, 366

ranked on a four-point scale by a sample of 962 adults on the dimensions: most liked, believability, and recall. Chi square tests were performed on the combined ranks for each dimension. R 5

13, 366

Calvin, A.D. & Dollenmayer, Karen S. SUBLIMINAL PERCEPTION: SOME NEGATIVE FINDINGS. *J. appl. Psychol.*, June 1959, 43(3), 187-188. (Hollins College, Hollins, Va. & Northwestern University, Evanston, Ill.).

To investigate subliminal perception, 60 female undergraduates were presented a two-word message at exposure speeds of .01, .02, and .03 second which, if perceived, would influence their choice of stimuli. Half of the subjects at each speed were given knowledge of results. An analysis of variance was conducted on the mean number of correct choices for each group. T. R 3

13, 367

Meadow, A. & Parnes, S.J. EVALUATION OF TRAINING IN CREATIVE PROBLEM SOLVING. *J. appl. Psychol.*, June 1959, 43(3), 189-194. (University of Buffalo, Buffalo, N.Y.).

To evaluate the effects of a creative problem-solving course on creative abilities and selected personality variables, pre- and post-measures were obtained on a group of 54 subjects taking a creative problem-solving course, and 54 subjects enrolled in other courses. These groups were matched very closely for age and Wechsler vocabulary score. The measures were: 1) two on quantity of ideas, 2) five on quality of ideas, 3) three on personality variables. To control for initial differences, analysis of covariance was used for the comparisons between experimental and control measures. T. R 15

13, 368

Baker, C.H. & Boyes, G.E. INCREASING PROBABILITY OF TARGET DETECTION WITH A MIRROR-IMAGE DISPLAY. *J. appl. Psychol.*, June 1959, 43(3), 195-198. (Defence Research Medical Labs., Toronto, Ontario, Canada).

This study was concerned with increasing the probability of detection of targets near locations representing maximum range on a radar-like display on which maximum range was presented by the center of the sweep line. Essentially the radar display was the B-scan type arranged as a "mirror-image" display. Two groups of subjects were tested on each of four conditions: conventional, horizontal, horizontal mirror-image, and vertical mirror-image; for one group the mirror-image display was twice the area of the others, for the other it had been equated. Targets were presented for one second at each of 13 locations. Target detections per

display were compared by analysis of variance. T. R 3

13, 369

Bourassa, G. L. & Guion, R.M. A FACTORIAL STUDY OF DEXTERITY TESTS. *J. appl. Psychol.*, June 1959, 43(3), 199-204. (Allis Chalmers Manufacturing Company, Milwaukee, Wisc. & Bowling Green State University, Bowling Green, Ohio).

A battery of dexterity and vision tests was factor analyzed to: 1) identify a "tweezer dexterity" factor and 2) determine the relationship between fine dexterities and visual skills, particularly depth perception. The battery was composed of tests constructed on the assumption of: 1) manual dexterity, 2) finger dexterity, 3) tweezer dexterity, 4) visual acuity, and 5) depth perception. Subjects were 100 female undergraduates. Thurstone's centroid method was used for the analysis, and five factors were extracted, three of these were identified. T. R 11

13, 370

Smith, E.E. & Kight, S.S. EFFECTS OF FEEDBACK ON INSIGHT AND PROBLEM SOLVING EFFICIENCY IN TRAINING GROUPS. *J. appl. Psychol.*, June 1959, 43(3), 209-211. (University of Delaware, Newark, N.J.).

This study was conducted in a field setting to determine whether 1) feedback will increase group productivity and self-insight, and 2) subgroup structure will result in increased group productivity and self-insight. Subjects were 54 male and 49 female foremen who were participating in a five-day management training course. There were subgroups with and without feedback and the control condition with no subgrouping. The task was a problem-solving type. Number of problems solved was compared for the feedback and group conditions by a non-parametric rank test. T. R 5

13, 371

Kay, B.R. THE USE OF CRITICAL INCIDENTS IN A FORCED-CHOICE SCALE. *J. appl. Psychol.*, Aug. 1959, 43(4), 269-270. (University of New Hampshire, Durham, N.H.).

This article illustrates the use of critical incidents in a forced-choice scale through the evaluation and analysis of the performance of foremen. The incidents were obtained through interviews with the personnel. These were then rated in terms of three levels of foremen performance for each foreman. The foremen were also rated independently by supervisors. These ratings were compared by correlation techniques. T. R 5

13, 372

Eilbert, L.R. & Glaser, R. DIFFERENCES BETWEEN WELL AND POORLY

ADJUSTED GROUPS IN AN ISOLATED ENVIRONMENT. *J. appl. Psychol.*, Aug. 1959, 43(4), 271-274. (American Institute for Research, Pittsburgh, Penn.).

This study "is concerned with the identification of possible predictors of personal adjustment to conditions of Arctic isolation." Subjects were 648 enlisted personnel. They were first rated by supervisors as to well or poorly adjusted. Then several measures were used to compare the two groups: biographical inventory, self-appraisal blank, incomplete sentences test, anxiety scale, medical symptoms list, etc. Also, aptitude and job proficiency scores were obtained. Mean scores on the various instruments were compared statistically for the two groups. Further study is suggested. R 12

13, 373

Keehn, J.D. FACTOR ANALYSIS OF REPORTED MINOR PERSONAL MISHAPS. *J. appl. Psychol.*, Oct. 1959, 43(5), 311-314. (American University of Beirut, Beirut, Lebanon).

This study investigated the view that past accident records can be used to predict accident likelihood in a Near Eastern cultural setting. A questionnaire about accidents and minor mishaps was administered to 100 males, mostly Arab university students. A factor analysis was performed on the intercorrelations between the responses. One general and three group factors were found. T. R 9

13, 374

Klemmer, E. T. NUMERICAL ERROR CHECKING. *J. appl. Psychol.*, Oct. 1959, 43(5), 316-320. (IBM Research Center, Yorktown Heights, N. Y.).

This study investigated the speed and accuracy of numerical error checking as a function of the probability of randomly placed errors and horizontal grouping of digits. Three error probabilities, 0.1, .01, and .001 and ten horizontal groupings involving groups of one through ten digits were tested on 30 naive and four trained subjects. Sessions were about 40 minutes. The findings were interpreted in terms of information handling rates. T. G.

13, 376

Meadow, A., Parnes, S.J. & Reese, H. INFLUENCE OF BRAINSTORMING INSTRUCTIONS AND PROBLEM SEQUENCE ON A CREATIVE PROBLEM SOLVING TEST. *J. appl. Psychol.*, Dec. 1959, 43(6), 413-416. (University of Arizona, Tucson, Ariz. & University of Buffalo, Buffalo, N. Y.).

To study the effects on creative problem solving of brainstorming vs. nonbrainstorming instructions, 32 college students, divided into four groups, were given either the Hangar or the Broom problem under one of the above sets of instructions. (They were

given the other problem under the other instructions in the second testing session.) The mean number of good solutions were compared for instructions, problems, test periods by analysis of variance technique. T. R 11

13, 377

Latics, V.G. EFFECTS OF MEPROBAMATE ON FEAR AND PALMAR SWEATING. *J. abnorm. soc. Psychol.*, Sept. 1959, 59(2), 156-161. (Johns Hopkins University, Baltimore, Md.).

Palmar sweating and self-ratings of "fear" were studied under the effects of meprobamate. Twenty subjects were given either placebo or the drug, went to a ferris wheel site, had initial palmar sweating measurements taken, rode a ferris wheel and made self-ratings of the amount of "fear" experienced after each revolution. A second palmar-sweating determination of 15 minutes (including a 10-minute ferris wheel ride) was made 45 minutes after the first ride. A brief discussion of the results is presented. T. G. R 11

13, 378

Pouliot, S. & Misiak, H. THE MEASUREMENT OF NEGATIVE AFTER-IMAGES IN FIRST-GRADE BOYS AND GIRLS. *J. genet. Psychol.*, Sept. 1959, 95(First Half), 13-17. (Fordham University, New York, N. Y.).

In order to develop a procedure for measuring latency, duration, and reappearances of after-images of young children, 40 American-born, white, six-year old children of both sexes made after-image responses to a set of nine stimuli administered in two sessions, nine days apart. All children were tested for color blindness, color naming, and animal and bird identification. The effect of color and sex on latency, duration, and reappearances of after-images was calculated and subjected to t-test. Discussion concerns the effects of the two independent variables. T. R 2

13, 379

Botwinick, J., Brinley, J.F. & Robbin, J.S. MODULATION OF SPEED OF RESPONSE WITH AGE. *J. genet. Psychol.*, Sept. 1959, 95(First Half), 137-144.

To determine the effect of age on "adaptive" slow performance, when instructions required slow performance, 34 "young" subjects (18-32 years) and 29 "old" subjects (65-81 years) were required to write in normal fashion, "New Jersey Chamber of Commerce." Subjects then wrote the same phrase at optimum speed levels (slow-fast-slow). Writing time was measured as a function of age and education. Pearson product moment correlations were performed on

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13, 381

results. Discussion is in terms of performance ranges as a function of age and motivational factors. G. R 15

13, 381

Rohrer, J.H. HUMAN ADJUSTMENT TO ANTARCTIC ISOLATION. Naval Research Reviews, June 1959, 1-5. (Georgetown University School of Medicine, Washington, D.C.).

The data reported here were collected for the purpose of providing better criteria for the Navy personnel assessment program. Reactions to isolation at stations in the Antarctic were discussed as these related to adjusting to other people in small as compared to larger stations, and in terms of duration of the isolation. Reactions of the men who were observed were discussed as these occurred over time, e.g., depressed and regressive behavior which occurred during winter, in terms of boredom, "problem" men, and characteristic reactions during final period of isolation.

13, 384

Gocka, E.F. SOME EFFECTS OF INTERRUPTION FREQUENCY ON THE PERCEPTION OF DIRECT CURRENT PHOSPHENES. Percept. mot. Skills, June 1959, 9(2), 183-189. (University of Washington, St. Louis, Mo.).

Contradictory findings reported in the literature regarding fusion for direct current stimulation were investigated in this study. A second goal of the investigation was to determine the effects of varying direct current pulse frequency on a phosphene threshold once this threshold had been obtained. One experienced subject served in three experimental sessions designed to investigate the first problem. Thirteen subjects were used to investigate the second question. Results were discussed as they related to previously reported findings regarding phosphene fusion. T. R 4

13, 385

Ammons, R.B. & Ammons, C.H. MOTOR SKILLS BIBLIOGRAPHY: XXVI. PSYCHOLOGICAL ABSTRACTS, 1955, VOLUME 29, FIRST HALF. Percept. mot. Skills, June 1959, 9(2), 199-202. (Montana State University, Missoula, Mont.).

This bibliography of ninety-eight titles covers the first half of Psychological Abstracts for 1955. The abstract number is included, together with titles of the article, author, and journal reference. R 98

13, 386

Zajac, J.L. DEPTH PERCEPTION OF STEREOSCOPIC IMAGES RESULTING FROM FUSION OF CROSSED AND UNCROSSED DOUBLE IMAGES. Amer. J. Psychol., June 1959, LXXII(2), 163-183. (University of Edinburgh, Edinburgh, Scotland).

Two experiments studied depth perception and relief using a "natural stereoscope". In experiment I, a stationary rod, 6 mm. in diameter, was placed 41.4 cm. in front of the subject in his median plane. A farther rod (same size) was varied, in ten cm. steps, from 70 to 150 cm. A fixated rod was introduced between them at appropriate distances. In experiment II, the farther object was a cardboard strip 1.75 cm. wide moved from 80 to 157 cm. From the results the author develops a theory of stereoscopic vision based on three laws which are discussed. T. G. 1. R 9

13, 387

Bruner, J.S., Wallach, M.A. & Galanter, E.H. THE IDENTIFICATION OF RECURRENT REGULARITY. Amer. J. Psychol., June 1959, LXXII(2), 200-209. (Harvard University, Cambridge, Mass. & University of Pennsylvania, Philadelphia, Penn.).

To examine sources of interference that prevent rapid, efficient identification of recurrent regularities in the environment, 92 subjects (in eight groups) predicted in which window (left or right) a light would appear. Prediction success determined the amount of money earned. Variations in procedure included: 1) degree of stimulus-interference--introduction of two out-of-pattern stimuli; 2) degree of response-interference--one group watched the light sequences (according to instruction) for the first three presentations; and 3) cost of error--knowledge of points earned for a correct response and lost for an incorrect. The results are related to problem-solving theory. T. G. R 6

13, 388

Jones, L.V. SOME INVARIANT FINDINGS UNDER THE METHOD OF SUCCESSIVE INTERVALS. Amer. J. Psychol., June 1959, LXXII(2), 210-220. (University of North Carolina, Chapel Hill, N.C.).

This article discusses invariance of different scaling methods under various conditions. Specifically, invariance of the estimates of scale-parameters obtained by the method of successive intervals is discussed. The invariance of equal interval scales is demonstrated under a number of conditions: 1) under changes in the number of categories and anchoring phrases used to define categories of a rating form; 2) when the assumptions of normality of subjective distribution is replaced by an assumption of normal error distribution of differences in subjective values obtained from repeated ratings; and 3) when the same scale form was used for rating of different sets of stimuli and was administered to distinct samples of respondents. T. G. R 16

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13, 389

Rock, I. & Engelstein, P. A STUDY OF MEMORY FOR VISUAL FORM. Amer. J. Psychol., June 1959, LXXII(2), 221-229. (New School for Social Research, New York, N. Y.).

To determine whether the trace of a visual form changes in any way over time or stays unchanged, 160 subjects, in eight groups, were shown a form (closed rectilinear) for 20 seconds and then dismissed. Upon recall (15 seconds, 1 day, 1 week, or 3 weeks) subjects: 1) reproduced the figure as accurately as possible, or 2) selected it from ten figures (ranging from identity to dissimilarity). A second experiment used a curvilinear figure and introduced some improvements in experimental design. Results are interpreted in line with various hypotheses of memory trace. G. I. R 11

13, 390

Saltzman, I. J. & Carterette, Teresa S. INCIDENTAL AND INTENTIONAL LEARNING OF ISOLATED AND CROWDED ITEMS. Amer. J. Psychol., June 1959, LXXII(2), 230-235. (Indiana University, Bloomington, Ind.).

To compare intentional and incidental learning of crowded and isolated material, two experiments were run: 1) 20 stimulus-items (ten nonsense syllables and ten three-digit numbers) were presented twice to each subject (60) for six seconds per item; and 2) a list of 14 two-digit numbers was presented to each subject (80) four times at the rate of six seconds per number. Both experiments used instructions to determine incidental and intentional learners. The relationship between isolation and ease of learning is discussed. T. R 13

13, 391

Gaito, J. VISUAL DISCRIMINATION OF STRAIGHT AND CURVED LINES. Amer. J. Psychol., June 1959, LXXII(2), 236-242. (Wilkes College, Wilkes-Barre, Penn.).

To test several hypotheses regarding ease of discrimination of straight and curved lines, two experiments are presented: 1) three experienced subjects were presented randomly with two stimuli (a straight line and a curved line) in four positions (horizontal, vertical, 45 degrees left and right); and 2) eight subjects were presented with the two stimuli above plus two other straight-line figures, representing a triangle and a rectangle. Various theories are discussed relevant to the results. T. I. R 11

13, 392

Krauskopf, J. & Riggs, L. A. INTER-OCULAR TRANSFER IN THE DISAPPEARANCE OF STABILIZED IMAGES. Amer. J. Psychol., June 1959, LXXII(2), 248-252. (Brown University, Providence, R. I.).

The possibility of interocular transfer of the phenomenon whereby a target imaged such that it remains fixed in position on the retina disappears with prolonged viewing was tested. By means of an optical arrangement utilizing among other things contact lenses with mirrors embedded in them, it was possible to present a target to the same spot on the retina of both eyes. The stimulus target was presented to one eye and the time required for it to disappear was recorded. The target was then presented to the same spot on the retina of the other eye and the time taken for it to disappear recorded. The data were treated by the Wilcoxon paired replicates test. T. I. R 7

13, 394

Jenkin, N. A RELATIONSHIP BETWEEN INCREMENTS OF DISTANCE AND ESTIMATES OF OBJECTIVE SIZE. Amer. J. Psychol., Sept. 1959, LXXII(3), 345-363. (The Training School at Vineland, N. J.).

To test the hypothesis that the apparent size of an object increases with increasing distance, 12 subjects in four experiments were required to match a series of squares ranging from 2-3/4 to 6 inches by steps of one-eighth inch with a four inch square which appeared at distances of 20, 40, 80, and 160 inches from the subjects and under two levels of illumination (26.5 and 11 foot candles). The results are analyzed by analysis of variance and are discussed in the light of several competing hypotheses. T. G. R 18

13, 395

Bergman, R. & Gibson, J. J. THE NEGATIVE AFTER-EFFECT OF THE PERCEPTION OF A SURFACE SLANTED IN THE THIRD DIMENSION. Amer. J. Psychol., Sept. 1959, LXXII(3), 364-374. (Cornell University, Ithaca, N. Y.).

Two experiments were performed to investigate negative after-effects and adaptation effects of prolonged viewing of a slanted surface monocularly and binocularly. First, six subjects viewed a slanted board through two tubes for four minutes. Six different degrees of slant were used: 15, 30, and 45 degrees forward and backward, from a plane perpendicular to the subject's line of sight. Adaptation was determined by subjective report. Negative after-effect was determined by having the subject attempt to set the board perpendicular to his line of sight. In the second experiment the subjects performed the same task only monocularly. T. R 20

13, 396

Dashiell, J. F. MONOCULAR POLY-OPIA INDUCED BY FATIGUE. Amer. J. Psychol., Sept. 1959, LXXII(3), 375-383. (Wake Forest College, Wake Forest, N. C.).

This article describes several cases of monocular polyopia induced by fatigue

(ocular work) and presents hypotheses as to the physiological bases of the phenomenon.

13, 400

Rosenbaum, G., Dobie, Shirley I. & Cohen, B. D. VISUAL RECOGNITIVE THRESHOLDS FOLLOWING SENSORY DEPRIVATION. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 429-433. (Wayne State University, Detroit, Mich.).

Divergent results reported in the literature in the area of sensory deprivation may be due to variations in conditions of deprivation, or to differences in measures of behavioral efficiency employed, or both. This study compares the effects of two different conditions of sensory deprivation on perceptual functioning in vision. Recognitive thresholds for five-digit numbers were obtained after periods of 0, 5, 15, and 30 minutes of total and of partial visual deprivation. Thirty-two subjects were divided into two equal groups, one subjected to total and one to partial visual deprivation. Results are discussed as they relate to findings reported in the literature, and to hypotheses regarding the effects of visual deprivation. T. G. R 5

13, 401

Winnick, Wilma A. & Wasserman, W. L. THE EFFECT UPON INCIDENTAL LEARNING OF VARYING THE INFORMATION ABOUT THE IRRELEVANT MATERIAL. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 434-442. (Queens College, Flushing, N. Y.).

Uncontrolled variation in strength of the set to learn incidental material could be a source of error in experiments on incidental learning. The present experiment attempted to vary the strength of the set to learn irrelevant material, and investigated the question whether, if incidental learning is affected, the efficiency of instructed also is affected. Fifty-four subjects were divided into three equated groups and given different instructions. Difference in scores were subjected to analysis of variance. Comparisons were made of both between group and within group differences. T. R 4

13, 402

Kappauf, W. E. & Payne, M. C. PERFORMANCE-DECREMENT AT AN OBSERVER-PACED TASK. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 443-446. (University of Illinois, Urbana, Ill. & Georgia Institute of Technology, Atlanta, Ga.).

The purpose of this study was to determine whether the rate of finding numbers changed significantly with long periods of observer-paced search. Sixty subjects, working in a group, searched test-booklets, pages of which each contained ninety pairs of

two-digit numbers. After two practice-periods, subjects worked uninterruptedly for seventy-five minutes on ten different pages. Subjects were instructed when to turn the pages. Performance was scored as the number of numbers found in each fifteen-minute period. The data were subjected to analysis of variance. The performance change over time was also presented in terms of mean number of numbers found in successive fifteen-minute periods. T. R 8

13, 403

Pedley, P. E. & Harper, R. S. PITCH AND THE VERTICAL LOCALIZATION OF SOUND. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 447-449. (Knox College, Galesburg, Ill.).

This experiment was designed to test two hypotheses regarding the relationship between pitch and vertical localization. 1) Each audible frequency has a particular height associated with it, implying a mechanism that discriminated on an absolute basis, or 2) tones are heard as high or low in pitch relative to some subjective standard. Twelve subjects were presented groups of low, intermediate, and high pitched tones, with two tones common to all groups. Results were discussed as they related to the hypotheses. T. G. R 2

13, 404

Soltz, D. F. & Wertheimer, M. THE RETENTION OF 'GOOD' AND 'BAD' FIGURES. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 450-452. (University of Colorado, Boulder, Colo.).

This study was designed to study whether contradictory results obtained from studies of form-perception designed to test a gestalt principle may have been due to differences in the kinds of figures used. The prediction was that "good" Gestalten should be more easily remembered than "bad" ones. Four "good" and four "bad" figures were presented to 60 subjects. Half of the subjects were tested for recognition immediately following exposure; the other half of the subjects were tested two weeks after original exposure. Results were discussed as they related to the Gestalt viewpoint. R 11

13, 405

Koletsky, H. S. & Kolers, P. A. A MULTI-FIELD ELECTRONIC TACHISTOSCOPE. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 456-459. (USAF Wright Air Development Center, Wright-Patterson AFB, Ohio).

This brief paper describes an electronic tachistoscope in detail which "permits precise control of duration, intensity, and sequence of many viewing fields." The present apparatus, extending the principle of the Dodge tachistoscope to several

viewing fields, makes it possible to explore visual functions over a wider range. I. R 2

13, 406

Sands, D.J. & Smith, K. J. NEW METHOD OF RESPIRATORY RECORDING. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), p. 460.

This note describes a method for respiratory recording which provides a method for circumventing such difficulties as have been encountered with such devices as the pneumograph (e.g., it is difficult to keep the rubber tube in place around the chest, it is easily damaged, and picks up nonrespiratory body movements). 1.

13, 408

Green, B.F., Jr., Wolf, Alice K. & White, B.W. THE DETECTION OF STATISTICALLY DEFINED PATTERNS IN A MATRIX OF DOTS. *Amer. J. Psychol.*, Dec. 1959, LXXII(4), 503-520. (Lincoln Labs., Massachusetts Institute of Technology, Bedford, Mass.).

To investigate the ability of human observers to detect patterns in "noisy" visual displays, seven experiments are reported (utilizing five observers) on the detectability of statistically determined bar-patterns in dot-matrices. Thresholds of detection were determined as a function of: duration of response, average number of dots on display, the subtended visual angle, grain of display, number of bars of dots, random variations in numbers of bars, and multiple exposures. Threshold functions and statistical analysis of performance are provided. The discussion compares the human observer and the "ideal" mechanical detector. The effects of the main variables on signal detection are discussed and the techniques are considered as a tool for future research. T. G. I. R 12

13, 409

Gebhard, J.W. & Mowbray, G.H. ON DISCRIMINATING THE RATE OF VISUAL FLICKER AND AUDITORY FLUTTER. *Amer. J. Psychol.*, Dec. 1959, LXXII(4), 521-529. (Johns Hopkins University, Baltimore, Md.).

Four sets of measurements were made of the ability of a subject to match the rates of intermittent white light (flicker) and white noise (flutter). Difference limens (DL) for comparing flicker and flutter were measured (by the method of adjustment) to assess the nature of: variables in cross sensory matching; simultaneous matching to fixed standard rates (two subjects made five matches at five frequencies: 5, 10, 20, 30, and 40 cps.); simultaneous matching to standard rates (same two subjects); and

successive matching to fixed standard rates (16 matches at each of 13 frequencies). Results are plotted and analyzed. Cross-sensory matching is compared with intersensory matching and discussion includes optimum conditions for intersensory matching. G. I. R 8

13, 410

Helson, H. & Rohles, F.H., Jr. A QUANTITATIVE STUDY OF REVERSAL OF CLASSICAL LIGHTNESS-CONTRAST. *Amer. J. Psychol.*, Dec. 1959, LXXII(4), 530-538. (University of Texas, Austin, Tex.).

In order to investigate the effects of reversal of "classical" lightness contrast, ten observers made 14 judgments of lighter-darker (on an 11-step scale) for each of four series of 14 gray, 7 by 11 inch cards. On one half of the card vertical white lines, 1 mm. in width, and on the other half, similar black lines were drawn. Distance or separation between the lines was varied (3 to 55 mm. in steps of 4 mm.). Each card was judged, on both halves, as to relative grayness. An analysis of variance of the lightness judgments was made and the significance of the difference between judgments of all separations was determined. Discussion is in terms of physiological correlates of contrast and association. T. I. R 16

13, 411

Dale, H.C.A. STRATEGIES OF SEARCHING IN TWO SIMPLE SYSTEMS. *Amer. J. Psychol.*, Dec. 1959, LXXII(4), 539-546. (Applied Psychology Research Unit, MRC, Cambridge, England.).

To examine the strategies in independent and in ordered searching, 117 subjects 1) located a faulty number in a row of independent items, and 2) located a fault in a simple flow system. Strategies of search were recorded by the experimenter and by the subjects and evaluated (by five judges). Search approaches are compared for different tasks and related to age and intelligence. T. R 13

13, 413

Held, R. & Schlank, M. ADAPTATION TO DISARRANGED EYE-HAND COORDINATION IN THE DISTANCE-DIMENSION. *Amer. J. Psychol.*, Dec. 1959, LXXII(4), 603-605. (Brandeis University, Waltham, Mass.).

To investigate adaptation to sensory-motor disarrangement (reduction of the errors of hand-eye coordination induced by a prism before the eye) 15 subjects were required to mark the location of targets under conditions of distorted vision. Hand movements were made under two conditions; self-produced movement and passive movement (the experimenter moved the subject's hand

by means of a sliding board). Increases in accuracy of performance under both conditions, (passive and active movement) are measured and discussed. I. R 6

13,414

Sherrick, C.E., Jr. SOME FACTORS AFFECTING AUDITORY DETECTION OF AMPLITUDE-MODULATION. *Amer. J. Psychol.*, Dec. 1959, LXXII(4), 606-608. (Washington University, St. Louis, Mo.).

To examine the effects of manipulation of rate of modulation and duration of intensity-increment (with the time of the incremental rise and fall constant) on difference limens (DL) of auditory signals, five trained subjects provided 20 DL's three times under modulation rates of 1, 2, 3, 4, 5 cps. combined with increment durations of 40-8000 msecs. The stimulus was a 1000 cps. pure tone at four db. intensity above threshold. Variations of the intensive DL are plotted as a function of rate and duration of the intensity increment. Results are discussed as to their application to audiometer design. G. R 5

13,415

Moed, G. SATIATION-THEORY AND THE MULLER-LYER ILLUSION. *Amer. J. Psychol.*, Dec. 1959, LXXII(4), 609-611. (Children's Seashore House, Atlantic City, N.J.).

To determine the effect of asymmetrical satiation, duration, and number of exposures on magnitude of the Muller-Lyer illusion, 60 paid female observers made equality settings of the segments of the illusion after fixed numbers of exposures (0, 5, 10, 15, 20, and 25, or 0, 10, 20, 30, 40, and 50 exposures). Magnitude of the illusion was measured and data were analyzed by means of Alexander's General Test for Trend. Results are discussed in terms of satiation theory. T. R 4

13,416

Valsi, E., Bartley, S.H. & Bourassa, C. FURTHER MANIPULATION OF BRIGHTNESS ENHANCEMENT. *J. Psychol.*, July 1959, 48(First Half), 47-55. (Michigan State University, East Lansing, Mich.).

To determine whether brightness enhancement is increased as PCF (pulse-to-cycle fraction) of intermittent stimulation is decreased below 0.3, and whether using one eye for the reference target and the other for a comparison target is more effective than using the same eye for both, two observers were tested under three general experimental procedures. Results were presented in a table showing relations between intensity of the steady target and the relative effectiveness of the intermittent target for

five different intensity levels, three different PCF's, and four different general conditions. T. R 20

13,417

Roehrig, W.C. THE INFLUENCE OF THE PORTION OF THE RETINA STIMULATED ON THE CRITICAL FLICKER-FUSION THRESHOLD. *J. Psychol.*, July 1959, 48(First Half), 57-63. (The Psychiatric Institute, New York, N.Y.).

To a) demonstrate that the total area of a foveally-fixated test patch is not effective for critical flicker fusion threshold (CFF), b) determine how large a central portion of the test-patch may be blocked out without affecting the CFF, and c) determine whether the "annulus-effect" is present over a wide range of test-patch diameters and frequencies, data were obtained from three observers. Results were presented graphically, showing mean difference in Log I_c between full-field-test-patcher and annuli. G. I. R 6

13,418

Noble, C.E., Alcock, W.T. & Frye, R.L., Jr. THE JOINT INFLUENCE OF PRACTICE AND INSTRUCTION ON DISCRIMINATION REACTION TIME. *J. Psychol.*, July 1959, 48(First Half), 125-130. (Montana State University, Missoula, Mont.).

To test the hypothesis that specificity of instructions is relevant to the acquisition of perceptual-motor skill, two groups of fifty-two subjects received 160 practice trials under instructions which varied in specificity. Differing instructions were designed to vary the number of competing responses in the task. Acquisition curves for the two groups were presented which showed mean reaction time as a function of practice under the two types of instruction. The learning device consisted of four units of the USAF Discrimination Reaction Time apparatus. The task was to snap the switch corresponding to the relative positions of the red light in any red-green stimulus pair. G. I. R 6

13,419

Arnhoff, F.N. ADULT AGE DIFFERENCES IN PERFORMANCE ON A VISUAL-SPATIAL TASK OF STIMULUS GENERALIZATION. *J. educ. Psychol.*, Dec. 1959, 50(6), 259-265. (Mental Health Research Unit, Syracuse, N.Y.).

To test the hypothesis that older subjects would have consistently fewer errors than younger subjects on a visual-spatial task of stimulus generalization, 60 practicing nurses and 54 members of a club for older persons were tested. Results were presented in terms of a) analysis of errors, b) reaction times, and c) reaction times and zero-error scores. T. R 20

13, 420

Cronbach, L.J. & Gleser, G.C. INTERPRETATION OF RELIABILITY AND VALIDITY COEFFICIENTS: REMARKS ON A PAPER BY LORD. *J. educ. Psychol.*, Oct. 1959, 50(5), 230-237. (University of Illinois, Urbana, Ill.).

This paper considered a paper contributed by Lord on the usefulness of unreliable difference scores. The present authors "identified three risks which may be taken into account in fixing strategies for test interpretation and for evaluating the usefulness of a test interpreted by a particular strategy." They placed emphasis on the maximum risk of erroneous interpretation of test scores rather than on average risk. Tables are presented showing the utility of tests for classifying persons under two different conditions. Test designers and selectors of tests are cautioned to interpret these, and similar tables, in the light of their particular situations. T. G. R 10

13, 421

Webb, W.B & Schwartz, M. MEASUREMENT CHARACTERISTICS OF RECALL IN RELATION TO THE PRESENTATION OF INCREASINGLY LARGE AMOUNTS OF MATERIAL. *J. educ. Psychol.*, April 1959, 50(2), 63-65. (USN School of Aviation Medicine, Naval Air Station, Fla.).

This brief paper described an experiment to test "the relationship between the consistency of measurement of information obtained by individuals and the number of items of information presented the individuals" at one time. Subjects were 345 naval cadets who read six stories, then were tested by one of four different methods. The data were treated by analysis of variance. T. R 2

13, 424

Ryan, T.A. COMMENTS ON ORTHOGONAL COMPONENTS. *Psychol. Bull.*, Sept. 1959, 56(5), 394-396. (Cornell University, Ithaca, N.Y.).

In this brief paper the author raises several points of disagreement with the method of orthogonal components proposed by Gaito (*Psychol. Bull.* 1959, 56, 392-393) as additional to methods discussed by the present author in a previous paper. The author also pointed out an important area of agreement with Gaito's formulation. T. R 4

13, 425

Myers, J.L. THE STATISTICAL ANALYSIS OF SOME GROUP EXPERIMENTS. *J. gen. Psychol.*, Oct. 1959, 61(Second Half), 205-210. (University of Massachusetts, Amherst, Mass.).

This paper analyzed the following experimental designs involving the application of treatments (e.g., stress) to social groups: 1) Groups-Within-Treatments, 2) the situation where a variable is introduced within each group, and 3) measurements for each subject repeated over time. Tables were presented which showed for each method the sources of variance, sums of squares, and degrees of freedom. Appropriate F tests, and possible extensions of each design were considered. T. R 2

13, 427

Brown, W.L. & Overall, J.E. IMPLICATIONS OF RECENCY EFFECTS FOR PROBABILITY LEARNING THEORIES. *J. gen. Psychol.*, Oct. 1959, 61(Second Half), 243-251. (University of Texas, Austin, Tex.).

Stochastic models have been constructed around the phenomenon of "probability matching" and have been primarily used in the investigation of human choice behavior. This paper presents a critical appraisal of appropriateness of stochastic models when the development of "probability matching" is from a "positive recency principle" as compared with "negative recency" behavior. Results from three experiments were presented to illustrate the "mechanism determining 'probability matching' for human 'subjects.'" G. R 22

13, 428

Clausen, J. & Karrer, R. PHOSPHENE THRESHOLD AS RELATED TO AGE AND SEX. *J. Psychol.*, April 1959, 47(Second Half), 189-198. (Training School at Vineland, N.J.).

To investigate the relationship between phosphene threshold and age and sex, a total of 142 untrained subjects ranging in age from ten to sixty-eight years were tested. Phosphene thresholds were recorded for four different conditions (two stimulus frequencies and two light conditions). Results are reported in terms of a) reliability, b) age differences, c) sex differences, and d) inter-correlations between these. T. G. R 11

13, 429

Perry, D.J., Mount, G.E. & Hull, C.D. THE EFFECT OF VARYING INTRAMUSCULAR DOSAGES OF ATROPINE AND BANTHINE ON THE GALVANIC SKIN RESPONSE. *J. Psychol.*, April 1959, 47(Second Half), 219-222. (University of California, Los Angeles, Calif.).

To investigate the effects of certain anticholinergic drugs, administered intramuscularly on the Galvanic Skin Response (GSR) ten subjects were tested. Results

were compared with those from other studies, particularly with those in which the drug had been administered orally. The findings are discussed as they relate to the evaluation of the GSR technique for comparing dose response effects of different anticholinergic drugs. T. G. R 6

13, 430

Rath, R. MEASURE OF SIMILIARITY IN WORK CURVES. *J. gen. Psychol.*, July 1959, 61(First Half), 39-44. (Ravenshaw College, Cuttack, Orissa, India).

The claim made by Philpott (*Fluctuations in Human Output*, Cambridge Univ. Press, 1932) that "work curves are based on elementary waves drawn from a 'pool of general purpose waves,' emergence of any particular wave being determined by factors other than of the task and the subjects", was tested, using 160 curves consisting of four different tasks taken from one individual. The curves were grouped into four categories, plus the grand total curve. Curves were tested using analysis of variance and correlation. Four conclusions were examined as they related to the "pool" theory. R 2

13, 431

Boardman, W.K., Aldrich, R.C., Reiner, M.L. & Goldstone, S. THE EFFECTS OF ANCHORS ON APPARENT LENGTH. *J. gen. Psychol.*, July 1959, 61(First Half), 45-49. (Baylor University College of Medicine, Waco, Tex. & Houston State Psychiatric Institute, Houston, Tex.).

To investigate the "accuracy and variability of absolute judgments of one inch, as well as the effects of stimulus anchors on these judgments," 61 subjects were asked to judge the length of a one inch line. Subjects were divided into three groups, receiving differing initial anchors. A method of limits technique was used. An anchor-reversed condition was also used, and changes in judgments of group with differing initial anchors were compared. The findings also were discussed in relation to analogous temporal judgments. T. R 4

13, 432

Woessner, Barbara L., Ross, S. & Andrews, T.G. EFFECTS OF SPEED-STRESS AND DISPLAY-CONTROL RELATIONSHIPS ON RESPONSE DISCRIMINATION. *J. gen. Psychol.*, July 1959, 61(First Half), 95-111. (University of Maryland, Baltimore, Md.).

To investigate the effects of certain display-control relationships and rates of signal presentation on performance accuracy and variability in a perceptual-motor task, thirty-six subjects were asked to respond to randomly presented signals by pressing one of five micro-switches. Performance on the task was continuous for

each of three time periods, and for each of three rates. The data obtained were analyzed in terms of rate, signal position, controls, trials, and sex. Four conclusions were given which result from the data obtained. T. G. I. R 21

13, 433

Andreas, B.G., Finck, A., Green, R.F., Smith, S., et al. TWO-DIMENSIONAL COMPENSATORY TRACKING PERFORMANCE AS A FUNCTION OF CONTROL-DISPLAY MOVEMENT RELATIONSHIPS, POSITIONING VS. VELOCITY RELATIONSHIP, AND MINIATURE VS. LARGE STICK CONTROL. *J. Psychol.*, Oct. 1959, 48(Second Half), 237-246. (University of Rochester, Rochester, N. Y.).

To determine how compensatory tracking performance at high level of skill varies as a function of a) varied control-display movement relations ("sensing"), b) position and velocity mode of control, and c) type of control, seven subjects performed a compensatory, two-dimensional tracking task. Subjects were trained to a stable (asymptotic) level of performance. Time on target scores were the principal measures of performance. Four principal findings were given, and efficiency of the experimental design was commented upon. T. G. R 7

13, 434

Spragg, S.D.S., Finck, A. & Smith, S. PERFORMANCE ON A TWO-DIMENSIONAL FOLLOWING TRACKING TASK WITH MINIATURE STICK CONTROL, AS A FUNCTION OF CONTROL-DISPLAY MOVEMENT RELATIONSHIPS. *J. Psychol.*, Oct. 1959, 48(Second Half), 247-254. (University of Rochester, Rochester, N. Y.).

To determine the effects of control-display movement relationship on performance of a two-dimensional tracking task using a miniature control stick, 40 subjects performed a continuous two-dimensional following tracking task. Two different planes of control movement were used, and two different direction of movement relationships between control and display in the y-axis. Mean time on target scores are plotted for each experimental condition. Findings are related to those from other studies in the same laboratory. T. G. R 7

13, 435

Dillon, D. DIFFERENCES BETWEEN ASCENDING AND DESCENDING FLICKER-FUSION THRESHOLDS AMONG GROUPS OF HOSPITALIZED PSYCHIATRIC PATIENTS AND A GROUP OF NORMAL CONTROL PERSONS. *J. Psychol.*, Oct. 1959, 48(Second Half), 255-262. (Columbia University, New York, N. Y.).

Flicker Fusion (FF) data obtained while investigating the effects of insulin and coma therapy were reanalyzed in view of findings which cast doubt on the validity of the use of the average of a series of ascending and descending determinations as the measurement of FF threshold. Data were regrouped to account for luminance, direction of stimulus presentation, session (before, during, or after therapy) and a patient-control grouping in terms of outcome of therapy. The data were treated both in terms of actual FF thresholds and in terms of the difference between ascending and descending thresholds. Two analyses of variance were carried out upon these data. Differences between ascending and descending thresholds were discussed as these were able to differentiate among patients and patients from controls. T. R 4

13, 436

Collins, W.E. THE EFFECTS OF DEUTERANOMALY AND DEUTERANOPIA UPON THE FOVEAL LUMINOSITY CURVE. *J. Psychol.*, Oct. 1959, 48(Second Half), 285-297. (Fordham University, New York, N.Y.).

Three specific hypotheses were tested regarding the relationship among normal, deuteranomalous, and deuteranopic subjects with regard to spectral sensitivity of their dark adapted fovea. Radiometric measurements were made, using three normal, three deuteranomalous, and two deuteranopic subjects. For every session (six) and subject the average of five wedge readings per wavelength were obtained, and converted into a log-microwatt value. Data were treated by the method of analysis of variance. Subjects within each color type were compared for variability in threshold requirements, and at the short wavelengths. Several possible explanations for causes of these color defects were advanced. T. G. R 24

13, 437

Lienert, G.A. & Traxel, W. THE EFFECTS OF MEPROBAMATE AND ALCOHOL ON GALVANIC SKIN RESPONSE. *J. Psychol.*, Oct. 1959, 48(Second Half), 329-334. (University of Marburg, Marburg-Lahn, Germany).

To test the hypothesis that meprobamate will decrease emotional reactivity in men, and to answer the question whether it acts as a neurosedative agent in the same way as alcohol, thirty clinically normal subjects were tested. Subjects were divided into three groups—meprobamate, ethyl-alcohol, and placebo. Affective reactions were produced by using two word association tests containing emotionally laden terms, used in pre-experiment and experimental sessions respectively.

Median scores of each subject in both pre- and main experiment were compared. T. G. R 18

13, 438

Bartley, S.H. SOME COMPARISONS BETWEEN PRINT SIZE, OBJECT POSITION, AND OBJECT SIZE IN PRODUCING PHENOMENAL DISTANCE. *J. Psychol.*, Oct. 1959, 48(Second Half), 347-351. (Michigan State University, East Lansing, Mich.).

To investigate the hypothesis that it is the visual angle subtended by the crucial target item at the eye that determines the apparent distance of the item, six observers each made ten readings for each of two general conditions. In five conditions, the comparison target was moved away and in the other five it was moved in the opposite direction. The size of the crucial item in a photographic print was manipulated either by simple enlargement of the print or by enlargement of the print to enlarge the item, but in connection with print cropping. Results were discussed as they relate to the law of the visual angle. T. R 3

13, 439

Riss, E. ARE HALLUCINATIONS ILLUSIONS? AN EXPERIMENTAL STUDY OF NON-VERIDICAL PERCEPTION. *J. Psychol.*, Oct. 1959, 48(Second Half), 367-373. (Brooklyn College, Brooklyn, N.Y.).

The purpose of this investigation was to investigate the relationship of auditory hallucinations to sound stimuli. Seven psychotic patients were trained to report the beginnings and ends of auditory hallucinations. Subjects were tested in sound treated rooms, the single sound stimulus being produced by a pure-tone audiometer at 125 cps. Each subject was tested for auditory hallucination under three levels of sound intensity. Results were discussed as they relate to the usually held definition of hallucinations as perceptions in the absence of sensory stimuli. T. R 29

14, 000

Adams, J.A. SOME CONSIDERATIONS IN THE DESIGN AND USE OF DYNAMIC FLIGHT SIMULATORS. Proj. 7716, Task 57050, AFPTRC TN 57 51, April 1957, 25pp. USAF Operator Lab., Randolph AFB, Tex.

This report presents a philosophy for flight-simulator design and utilization, particularly in reference to current and future manned air weapons. Two types of simulators (whole-task and part-task) are discussed along with the need for guiding principles for their design and use in training and proficiency measurement for modern, manned air weapons. Present-day simulators of both types were examined, and the experimental literature on transfer of

training was surveyed and related to fidelity-of-simulation problems. Recommendations are included. R 24

14,003

West, L.J. AN EXPERIMENTAL COMPARISON OF NONSENSE, WORD, AND SENTENCE MATERIALS IN EARLY TYPING TRAINING. AFPTRC TN 57 108, Aug. 1957, 9pp. USAF Personnel and Training Research Center, Lackland AFB, Tex. (Reprinted from: J. educ. Psychol., Dec. 1956, 47(8), 481-489).

This experiment evaluated four types of early keyboard learning practice materials in typewriting: single-finger nonsense sequences, short words, long words, and sentences. Each of these four types was used by a different group of learners for the first hour of practice. During the second and last hour, all learners used the same code and alphabetic sentence materials. Speed and error scores on the final tests using code and alphabetic sentences were analyzed for differences due to type of material originally used for practice. Factors that might account for the observed differences are discussed. T. G. R 3

14,007

Willingham, W.W. PERFORMANCE DECREMENT FOLLOWING FAILURE. Special Rep. 58 9, May 1958, 5pp. USN School of Aviation Medicine, Naval Aviation Medical Center, Fla.

To investigate performance decrement after failure on a check flight as a function of interval between failure and subsequent performance, the flight records of 648 students whose first failure occurred on A-18, A-19, or B-17 during the latter half of 1956 were studied. Two grades were computed: average flight grade up to time of failure, and grade on extra time flight immediately following failure. Grade decrements as a function of days elapsing between failure and subsequent flight were analyzed for each of the three types of flight and for groupings of superior and inferior students. Recommendations are included. G.

14,008

Xhignesse, L.V. SELECTIVE SURVEY OF FRENCH DEVELOPMENTS IN FLIGHT SIMULATORS AND FLIGHT INSTRUMENTS. I. FLIGHT SIMULATORS. Contract AF 33(616) 3000, Proj. 6190 71573, WADC TN 57 378, June 1958, 19pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Illinois, Urbana, Ill.).

A selective survey of French developments in aircraft and missile simulation was conducted. The survey covered the characteristics of a flight simulator for a primary trainer or the conventional engine type, three

types of helicopter simulators, and a simulator for an air-to-air or ground-to-ground missile. Each simulator is described and its salient characteristics delineated.

14,009

Thompson, M.E. RESPONSE GENERALIZATION AS A FACTOR IN THE ACQUISITION OF MILITARY SKILL: RIFLE TARGET PRACTICE. (SECOND QUARTERLY REPORT). Contract HumRRO 650 021, 14pp. Institute of Science and Technology, University of Arkansas, Fayetteville, Ark.

This is a progress report of an investigation of the hypothesis that training for accuracy in rifle firing may be facilitated by application of principles derived from studies on response generalization. The primary variable studied is range of reinforcement—a buzzer is activated by shots of the required degree of accuracy. Subjects are assigned randomly to one of three groups and given 50 shots in blocks of five. Total, constant and variable errors will be analyzed for effect of area of reinforcement. This report presents results for 68 subjects. T. G.

14,010

Thompson, M.E. RESPONSE GENERALIZATION AS A FACTOR IN THE ACQUISITION OF MILITARY SKILL: RIFLE TARGET PRACTICE. (THIRD QUARTERLY REPORT). Contract HumRRO 650 021, Oct. 1954, 8pp. College of Arts and Sciences, University of Arkansas, Fayetteville, Ark.

This progress report presents some data gathered in the course of an investigation on rifle marksmanship (see 14,009). The results of 27 subjects who missed the target on one or more shots have been tabulated and various error scores calculated. Other data on 95 subjects are presented. T. G.

14,016

Smode, A.F., Beam, J.C. & Dunlap, J.W. MOTOR HABIT INTERFERENCE. A RESUME OF THE LITERATURE AND THE DEVELOPMENT OF PRINCIPLES FOR ITS MINIMIZATION IN TRAINING. Contract NONR 2515(00), Jan. 1959, 106pp. Dunlap and Associates, Inc., Stamford, Conn.

This report is concerned with the role of habit interference in perceptual-motor learning and performance, especially as it relates to operational training within the military environment. Three major sections are developed: 1) a technical review of the literature on habit interference with a brief non-technical summary, 2) the development of techniques and procedures for minimizing effects of interference in

42-117

14, 026

perceptual-motor learning, and 3) the development of categories of behavior which embrace the variety of motor-manipulative jobs for which military personnel are trained together with principles for minimizing habit interference in them. R 148

14, 020

Irion, A.L. & Briggs, L.J. LEARNING TASK AND MODE OF OPERATION VARIABLES IN USE OF THE SUBJECT-MATTER TRAINER. Contract AF 41(657) 13, Proj. 7709, Task 37302, AFPTRC TR 57 8, Oct. 1957, 19pp. USAF Maintenance Lab., Lowry AFB, Colo.

Two studies are reported herein that were conducted as part of an experimental evaluation of the Subject-Matter Trainer, a device designed for potential use in Air Force technical training. One study deals with the comparative effectiveness of four modes of operation when each is employed solely throughout a 20-minute practice period for each of three kinds of learning tasks. The second study concerns the relative effectiveness of selected combinations of two or more of these modes of operation when used in sequence during different portions of the practice period. Retention test scores (immediate and after one week) were analyzed for differences due to mode of operation. T. I. R 3

14, 023

Briggs, L.J. & DuVall, W.E. DESIGN OF TWO FIRE CONTROL SYSTEM MAINTENANCE TRAINING DEVICES. Contract AF 41(657) 83, Proj. 7709, Task 37302, AFPTRC TR 57 7, Sept. 1957, 13pp. USAF Maintenance Lab., Lowry AFB, Colo.

This report outlines early developments in fighter-interceptor fire control system maintenance trainers and describes two new training device designs which appear to have achieved many improvements over earlier devices. Job tasks descriptions for the MG-10 Fire Control System (Aircraft and Weapon Control System) maintenance training were developed to indicate the range of tasks needing practice. The two trainers developed were 1) a radar procedural trainer and 2) a computer checking, adjusting, and troubleshooting device. Recommendations for prototype devices are made. R 2

14, 024

Ericksen, S.C. THE SPECIAL INSTRUCTIONAL PROBLEMS OF TEACHING AVIATION IN THE CLASSROOM. Contract NONR 2149 (01), Aug. 1958, 42pp. Vanderbilt University, Nashville, Tenn.

This manual is a summary document which makes a direct attempt to synthesize transfer of training information for the possible improvement of the aviation training

at the United States Naval Air Station, Pensacola, Florida. The purpose of this type of manual is to give the instructor a perspective, a better understanding of how a training program incorporates the major variables that control the learning process. The several sections include the role of the instructor in the ground school, the trainee and his schedule, kinds of learning that occur, transfer of training as the "pay-off", major factors in learning, and some classroom procedures to maximize transfer of learning.

14, 025

Baker, R.A., Mac Caslin, E.F., Kurtz, K. H. & Baerman, D. J. AN EVALUATION OF THE ON-THE-JOB PROFICIENCY OF TRAINED TANK CREWMEN. Special Rep. 14, June 1958, 57pp. Human Resources Research Office, George Washington University, Washington, D.C.

To determine the on-the-job proficiency of trained tank crewmen, 256 highly experienced tank commanders, gunners, drivers, and loaders in combat-ready armor units were interviewed and given performance tests on the armor skills basic to each crew position. In addition, job interchangeability within the tank crew was measured by a pencil-and-paper test designed to measure knowledge about the four crew positions. This test was administered to 715 tank crewmen. Implications of the findings for improving tank crew proficiency are discussed. T. G. R 6

14, 026

Samuel, J.A. & Seli, R.G. SOME DESIGN CHARACTERISTICS OF HAND-OPERATED MASTER CONTROLLERS IN STEELWORKS. PE/N/12/55, Oct. 1955, 19pp. Plant Engineering Div., British Iron and Steel Research Association, London, England.

To establish optimum design characteristics of a hand operated master controller, three characteristics were investigated: number of speed steps (6, 4, and 3 in both forward and reverse directions), arc of movement of controller handle (50, 35, and 20 degrees on either side of "off" position), and length of handle (9, 12, and 15 inches). The seat was adjusted to optimum operating conditions for each of three operators who performed settings under each of the 27 possible conditions. Order of settings were such as to eliminate effects of learning and subject differences. Subjects also rated each setting on a four-point scale of difficulty. Time and ease of setting were the criteria against which characteristics were measured. T. G. I. R 5

14,027

Vernon, M.D. LEARNING FROM GRAPHICAL MATERIAL. MRC 47 376, APU 20, Aug. 1945, 5pp. Applied Psychology Research Unit, MRC, Cambridge, England.

To demonstrate to what extent and how accurately information set out in graphs and charts is likely to be understood by the general population, two sets of data were prepared in graphs, pictorial charts of the isotype variety, and, as a control, in tables of figures. One or the other of these sets, preceded by a short explanatory statement about the information they were intended to convey, was presented to groups of airmen, soldiers, and college students, numbering 231 persons in all. They were required to recall the information given immediately after studying it, either in their own words, or as answers to questions. Recommendations for the use of these graphic materials are included.

14,029

Drucker, A.J. LISTINGS AND ABSTRACTS OF PRB TECHNICAL RESEARCH REPORTS AND NOTES-FY 1957. PRB Tech. Res. Note 81, Sept. 1957, 47pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

This report identifies by publication serial number all research publications prepared by research scientists of the Personnel Research Branch and released in fiscal year 1957. The listing includes 12 Technical Research Reports, 19 Technical Research Notes, and 33 Research Memorandums. Abstracts are given for the Reports and Notes. R 44

14,030

Gagne, R.M. & Bolles, R.C. A REVIEW OF FACTORS IN LEARNING EFFICIENCY. AFOSR TN 58 924, Nov. 1958, 30pp. USAF Office of Scientific Research, ARDC, Washington, D.C. (Princeton University, Princeton, N.J. and University of Pennsylvania, Philadelphia, Penn.).

This report attempts to identify the manipulable conditions of learning which may be used to insure maximum transfer to tasks of the job. This is the meaning of "learning efficiency" as used here. Three kinds of tasks found in the Air Force for which learning is required are distinguished: identification, procedure following, and concept using. For these kinds of performance, the experimental evidence regarding training variables likely to lead to maximal learning efficiency are described and discussed. R 58

14,031

Gustafson, H.W. RESEARCH ON METHODS OF EVALUATING MAINTENANCE PROFICIENCY. Proj. 7709,

Task 37303, AFPTRC TR 58 6, Jan. 1958, 9pp. USAF Maintenance Lab., Lowry AFB, Colo.

Four separate research and development efforts are reported which relate to the improvement of performance-testing techniques for maintenance personnel: 1) the preparation of a guidebook on performance evaluation for use by instructors in Air Force technical schools; 2) a statistical reanalysis of proficiency test data to relate trouble-shooting performance to specific kinds of aptitudes and basic knowledge and to determine types of errors committed in performing complex alignments and adjustments; 3) the development of two microfilm projection devices to aid in training; and 4) an investigation of effects of variations in performance-testing procedures. R 5

14,041

McGuigan, F.J. A COMPARISON OF THE WHOLE AND PART METHODS OF MARKSMANSHIP TRAINING. July 1953, 17pp. Human Resources Research Office, George Washington University, Washington, D.C.

To compare M1 marksmanship proficiency under two methods of instruction; 1) the currently used part method, and 2) a whole method in which the firing act is taught as an integrated practice unit, an experiment was carried out using identical procedures at two army installations. A single infantry basic training company was divided into four matched (rifle steadiness, intelligence) platoons and trained as follows: 1) part method, 2) whole-live-fire method, 3) whole dry-fire method, and 4) no training. The criterion of proficiency was the pit scores obtained during four days of firing on the known-distance range. These scores were analyzed for effect of part versus whole method, live versus dry firing, and high versus low intelligence. T. G.

14,042

McGuigan, F.J. & MacCaslin, E.F. A COMPARISON OF WHOLE VERSUS PART METHODS OF MARKSMANSHIP TRAINING. May 1954, 38pp. Human Resources Research Office, George Washington University, Washington, D.C.

To compare two methods of M1 rifle instruction (Army Training Program Step-by-Step and an experimental "whole" procedure), two separate groups of infantry trainees were tested at two military training centers. For each test four sub-groups were selected by matching on a test of rifle steadiness, then given appropriate training, and finally tested for firing ability immediately following training and two months later. The data were analyzed for immediate and

long term differences between the two methods. Other analyses included a study of the relation of intelligence, and the effect of spacing of live fire (Whole Method) versus concentration in final period (Part Method). T. G. 1.

14,044

Mead, L.C. (Chm.). TRAINING RESEARCH. SCOPE, METHODOLOGY, AND CONTRIBUTIONS. HTD 200/2, April 1951, 36pp. US Department of Defense, Washington, D.C.

This report presents the papers and discussions of the symposium on Training Research. The central objective of the symposium was to clarify and discuss the purpose, methodology, and contributions which can be made by training research to the efficient utilization of human resources in furthering military objectives and utilizing modern war equipment.

14,047

Miller, E.E. TRANSFER EFFECTS OF SPECIAL TRAINING UPON PRE-SOLO FLIGHT TRAINING. Res. Proj. NM 16 01 11, Subtask 13, Rep. 1, Sept. 1958, 63pp. USN School of Aviation Medicine, Naval Air Station, Fla.

Analysis of the learning situation in naval pre-solo flight training resulted in the development of economical, simple, and administratively feasible training aids for the following areas: procedures, trimming knowledge of local area, nose attitudes, and landing approaches. The techniques developed were applied to 72 pre-solo students according to a complex (factorial) experimental design, and the effects of the particular techniques were assessed independently. Criterion measures were pre-solo flight grades, flight instruction time, rankings by flight instructor, comments on questionnaires, and some secondary criteria. The findings are related to training theory and problems. T. G. 1. R 52

14,048

Miller, E.E. EVALUATION OF INSTRUMENT-TRANSITION VERSUS TRANSITION-INSTRUMENT SYLLABUS. Special Rep. 57 23, Sept. 1957, 11pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To evaluate a recommendation that the sequence in flight instruction in the VS/VP Phase 1 syllabus be changed to offer instruction in basic instruments before transition, precision and acrobatics, 100 students from each of the two syllabus orderings were compared. Safety was analyzed by comparing the number of downs and warm-ups as recorded for transition, precision, acrobatics, and instruments; accident data were also studied. Other factors

studied were training time, cost, flying skill, grades, attritions, and opinions of both students and instructors. T. G. R 4

14,049

Miller, R.B. & Slebodnick, E.B. RESEARCH FOR EXPERIMENTAL INVESTIGATIONS OF TRANSFERABLE SKILLS IN ELECTRONIC MAINTENANCE. Contract AF 41(657) 71, Proj. 7729 (7709), Task 37300, AFBTRC TR 58 2, Jan. 1958, 21pp. USAF Personnel and Training Research Center, Lackland AFB, Tex.

To determine the extent to which special training in generalized maintenance skills may lead to positive transfer in excess of that obtained from training in specific maintenance skills, two laboratory experiments were conducted. In the first, 24 high school students (males) performed two types of electronic maintenance, 1) after learning "what to search for" in the job environment, or 2) following study of "principles of trouble shooting." In the second, 36 subjects were scored on performance of specific trouble shooting problems after training in 1) trouble shooting principles, or 2) concepts of data flow only. The findings are discussed in relation to training programs for electronic trouble shooting. T. R 4

14,063

USN Personnel Measurement Research Branch. ABSTRACTS OF RESEARCH REPORTS. March 1958, 84pp. USN Personnel Measurement Research Branch, Washington, D.C.

This publication contains abstracts of reports of studies conducted by the Bureau of Naval Personnel or by contract with Bureau funds. These abstracts are arranged in chronological order according to date of publication. Part I covers the period January 1951 through September 1957 in the area of selection and classification; other parts will be published later. A subject index is included. R 128

14,071

Rulon, P.J. & Brooks, W.D. A COMPARISON OF TWO METHODS OF TEACHING MORSE CODE. Contract N 61339 294, ERC Proj. 49 7, Letter Order 7, Exp. Design Proj. 9 4074, July 1958, 68pp. Educational Research Corporation, Cambridge, Mass.

This report contains a description of two methods of teaching Morse Code: the current Navy method based upon the Code-Voice technique, and the Robins method based upon development of three skills (audio-perception, interpretation, type-writing). The design and rationale of an experiment for comparing the relative efficiency of these two methods is presented in some detail. R 19

14,072

14,072

Rulon, P. J., Brooks, W. D. & Baldwin, W. W. A COMPARISON OF TWO METHODS OF TEACHING TYPEWRITING. Contract N 61339 294, Proj. 9 4074, ERC Proj. 49 7, Letter Order 7, July 1958, 17pp. Educational Research Corporation, Cambridge, Mass.

This report contains a description of the design of an experiment for comparing the current Bureau of Naval Personnel method of teaching typewriting to communications personnel with a method developed by Personnelman Robins. The two methods are described and compared for differences. The rationale for the experimental design is also presented. R 20 (approx.)

14,073

Rulon, P. J., Langmuir, C. R. & Schweiker, R. F. THE DEVELOPMENT OF A PERFORMANCE TEST OF TROUBLE-SHOOTING PROFICIENCY FOR AN/APQ-24 RADAR MECHANICS. VOLUME I. Contract AF 33(038) 14562, HRRRC Proj. 507 007 0001, ERC Proj. 25, July 1953, 74 pp. Educational Research Corporation, Cambridge, Mass.

This report describes the development and the details of a performance test of a radar mechanic's ability to "shoot trouble" in an AN/APQ-24 airborne radar system. The test situation is a standardized performance exercise in which observations of performance are restricted to the mechanic's adaptations to a malfunctioning radar system. Evaluation of the test problems and the related equipment, administration and scoring procedures are discussed. T. I.

14,074

Rulon, P. J., Langmuir, C. R. & Schweiker, R. F. THE DEVELOPMENT OF A PERFORMANCE TEST OF TROUBLE-SHOOTING PROFICIENCY FOR AN/APQ-24 RADAR MECHANICS. VOLUME II. APPENDICES. Contract AF 33(038) 14562, HRRRC Proj. 507 007 0001, ERC Proj. 25, July 1953, 34pp. Educational Research Corporation, Cambridge, Mass.

This volume contains the appendices to a previous report "The Development of a Performance Test of Trouble-Shooting Proficiency for an AN/APQ-24 Radar Mechanics" (see 14,073). Appendix A contains the six final forms of the test; Appendix B contains the 1) key to control switches and problem numbers, 2) information and instructions for judges, 3) definition of problem classification symbols, and 4) a description of 114 problems; Appendix C contains the ratings of six judges on the 114 problems and tables of data reprinted from the text.

14,082

Smith, D. D. (Head). BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS. SUPPLEMENT NO. 2: JULY 1957 - JULY 1958. USN Personnel and Training Branch, ONR, Washington, D. C.

This is the second supplement to the Bibliography of Unclassified Research Reports of the Personnel and Training Branch, Office of Naval Research. Listed are reports received from contractors during the period July 1957 to July 1958. Categories used to classify the reports are: basic traits, selection problems, billet classification, performance criteria, training and education. R 34

14,086

Stiles, Helen J. & Demares, R. G. MAINTENANCE PERSONNEL AND TRAINING RESEARCH: A BIBLIOGRAPHY. March 1958, 115pp. USA Air Defense Human Research Unit, Fort Bliss, Tex.

This bibliography includes reports only if their contents are substantially and specifically applicable to maintenance personnel. Unique contributions in the area of job requirements and maintenance job descriptions are included. The majority of the reports appeared in 1951 or later. Reports are arranged in subject matter sections with references listed alphabetically by senior author: maintenance research programs and their management, design of equipment and work situations for maintainability, job description and forecasting, selection, training, training equipment, proficiency measurement, job aids and handbooks, collected works, and bibliographies. R 368

14,093

Zeidner, J., Martinek, H. & Anderson, A. A. EVALUATION OF EXPERIMENTAL PREDICTORS FOR SELECTING ARMY HELICOPTER PILOT TRAINEES-I. PRB Tech. Res. Note 99, Oct. 1958, 35pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D. C.

As part of a long-range research effort to improve selection of helicopter pilot trainees, scores on 41 experimental measures (4 background, 11 reference or control, 11 ability or aptitude type, and 15 personality and/or leadership type) were obtained for 310 trainees undergoing the helicopter pilot training course at Fort Rucker, Alabama. These scores were compared with three types of achievement indexes: flying proficiency, academic achievement, and leadership proficiency. The findings were used in determining the composition of a final experimental battery for the long-range study. T. R 2

14, 094

Harvard School of Public Health.
PUBLICATIONS IN THE FIELD OF HIGH-
WAY SAFETY. Jan. 1959, 2pp. Harvard
School of Public Health, Boston, Mass.

This is a list of publications by Ross
McFarland in the field of highway safety.
The period covered is 1952 through 1958.
R 25

14, 095

Upshaw, H. S. DEVELOPMENT OF
PROTOTYPE PROFICIENCY TESTS FOR
SAGE OPERATORS: INTERCEPT DIREC-
TOR. ERC Proj. 46, Contract AF 41(657)
95, Proj. 1975, Task 76892, AFCRC TN
58 58, Sept. 1958, 13pp. Educational Re-
search Corporation, Cambridge, Mass.

The test battery for Intercept Direc-
tor was administered to 41 persons. It was
developed from a job analysis, and con-
tained decision and diagnostic items. On
the basis of the scores for these persons
with varying amounts of experience, sug-
gestions for revisions of the test are in-
dicated in detail. T.

14, 096

Upshaw, H. S. PROFICIENCY TEST
RESULTS IN THE SAGE TECHNICAL
TRAINING DEPARTMENT: INTERCEPT
DIRECTOR. ERC Proj. 46, Contract AF
41(657) 95, Proj. 1975, Task 76892, OAL
TM 58 11, Sept. 1958, 5pp. Educational
Research Corporation, Cambridge, Mass.

The Intercept Director test was ad-
ministered to 15 instructors at the SAGE
Technical Training Department, and to
nine Intercept Directors at the Experimental
SAGE Sector. The test areas are: 1)
knowledge of correct procedures, actions
and decisions, 2) knowledge of computer
functioning, 3) ability to make efficient
tactics decisions, 4) ability to read and
interpret situation display, 5) ability to
read and interpret digital display. The
scores are obtained and compared for the
two groups. T.

14, 097

Upshaw, H. S. RESULTS OF PRO-
FICIENCY TESTING AT ESS: INTERCEPT
DIRECTOR. ERC Proj. 46, Contract AF
41(657) 95, Proj. 1975, Task 76892, OAL
TM 58 5, Sept. 1958, 5pp. Educational
Research Corporation, Cambridge, Mass.

The test for Intercept Director was
administered to 15 persons at the Experi-
mental SAGE Sector and to 15 persons at
the SAGE Technical Training Department.
The test areas are: 1) knowledge of cor-
rect procedures, actions and decisions, 2)
knowledge of computer functioning, 3) abil-
ity to make efficient tactical decisions, 4)
ability to read and interpret the Situation

Display, 5) ability to read and interpret the
Digital Display. Scores were obtained and
analyzed. Further test development is in-
dicated. T.

14, 098

Griswold, G. M. "PARACHUTE
JUMPING FROM ARMY AIRCRAFT."
FIFTH PARTIAL REPORT OF PROJECT NR
AB 2354. DA Proj. 87 03 002, RDB Tech.
Obj. AL 12, June 1957, 16pp. USA Air-
borne and Electronics Board, Fort Bragg,
N.C.

This is one of a series of reports from
a study seeking to determine optimum exit
methods, safe procedures, special equip-
ment needed, and the suitability of various
types of Army aircraft for parachute de-
livery of personnel. The results of tests on
the U-1A Airplane are reported here. Tests
of adaptability consisted of inspection, test
flying, and review of technical data. Var-
ious procedures for parachute delivery were
static tested and evaluated. Safe procedures
were established. I. R 7

14, 099

Warren, N. D., Dossett, W. F. &
Ford, J. S. A CORRELATIONAL ANALY-
SIS OF ACHIEVEMENT IN A GENERALIZED
ELECTRONIC TROUBLESHOOTING
COURSE. Contract AF 41(657) 44, Proj.
7709, Task 37301, AFPTRC TN 57 148,
Dec. 1957, 34pp. USAF Maintenance Lab.,
Lowry AFB, Colo.

Previous research led to the develop-
ment of the Generalized Electronic Trouble-
shooting Trainer (GETS) and a training cur-
riculum. Attention was given in this study
to the factorial structure of troubleshooting
achievement measures and the estimates of
achievement scores from standardized abil-
ity tests. Achievement measures were
scores on a written test and on the GETS
trainer. Sixteen standardized tests of spe-
cial abilities were also given. Subjects
were 90 high school males, 16-19 years old,
with mental ages from 156-253 months. A
factor analysis was conducted to reveal the
underlying factors. T. R 6

14, 105

Zeidner, J., Martinek, H. & Klieger,
W. A. ANALYSIS OF FLIGHT EVALUATIONS
OF ARMY HELICOPTER PILOT TRAINEES.
DA Proj. 29560000, PRB Tech. Res. Note
93, April 1958, 21pp. USA Personnel Re-
search Branch, Adjutant General's Office,
Washington, D.C.

As part of a long-range research ap-
proach to the problem of high attrition in the
Army Cargo Helicopter Pilot Course, this
study was undertaken to provide insight into
the various methods used to evaluate trainees.
Relationships among training, flight grades,

final course grades, and the pass-fail decision of the review board pertaining to the Presolo stage of ACHPC were determined for 487 trainees at Fort Rucker, Alabama. The utilization of the findings in formulating the predictor research criterion is discussed. T. R 1

Zeidner, J., Martinek, H. & Anderson, A. A. EVALUATION OF EXPERIMENTAL PREDICTORS FOR SELECTING ARMY HELICOPTER PILOT TRAINEES II. DA Proj. 29560000, PRB Tech. Res. Note 101, Dec. 1958, 34pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

As a part of a long-range research effort to improve selection of helicopter pilot trainees, scores on eight psychomotor ability/aptitude tests, eight paper and pencil ability/aptitude tests, ten personality-background tests, four background factors (age, education, rank, and previous flying experience) and the three leadership variables of the interim operational battery were compared with indexes of leadership ability, helicopter flying proficiency, and academic ability for 217 helicopter pilot trainees. The findings were used in determining the composition of the final experimental and for the 1959 operational battery of tests. T. R 4

Peters, G. A. & Gardner, S. INDUCING CREATIVE PRODUCTIVITY IN INDUSTRIAL RESEARCH SCIENTISTS. Psychological Research Associates, Inc., Encino, Calif. & University of Southern California, Los Angeles, Calif.

The thesis of this paper is that there is a real and important crisis in American science - the apparent lack of scientific creativity and inability of the research scientist to function effectively in group research projects. Causative factors are discussed together with specific actions that could be taken by industrial management and by those in charge of academic training of scientists. Certain personal characteristics of scientists are pointed to as needing special remedial attention. Special creativity-induction training programs are discussed.

Bulbin, Eunice. THE INFLUENCE OF INTERPOLATED RECALL UPON RECOGNITION. APU 136 50, 1950, 7pp. Applied Psychology Research Unit, MRC, Cambridge, England.

To investigate the effect of interpolated activity (immediate recall) upon the recognition of an original experience, subjects (16) were shown a picture. One-half of the group were asked to recall it and were then given a recognition test; the other half were given

only the recognition test after the same interval. A second experiment with a further group of 24 subjects was conducted along similar lines. Number of correct identifications of the picture were compared for the experimental and control groups. The findings are discussed in relation to factors which militate against identification after recall. T. R 5

Meehan, J. P. & Jacobs, H. I. RELATION OF SEVERAL PHYSIOLOGICAL PARAMETERS TO POSITIVE G TOLERANCE. Contract AF 33(616) 2952, Proj. 7216, Task 71712, WADC TR 58 665, Jan. 1959, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Physiology, School of Medicine, University of Southern California, Los Angeles, Calif.).

To study the relationship of several physiologic parameters to positive g-tolerance, a series of experiments were undertaken. Blood pressure, blood volume, and physical condition as measured by both the Harvard Step Test and a modified physical fitness test were the parameters and g-tolerance was measured as that acceleration which caused a loss of peripheral vision. Subjects were studied at the end of one month of enforced rest and again at the end of one month of supervised physical training. T. G. R 4

Bloch, D. S. REVIEW OF QUALITATIVE PERSONNEL REQUIREMENTS FOR SAGE SYSTEM TECHNICAL COORDINATION CENTER. Contract AF19(604) 2430, Proj. 1975, Task 76892, ERC Proj. 48, AFRCR TN 58 53, April 1958, 156pp. Educational Research Corporation, Cambridge, Mass.

This report reviews available development information on critical job requirements for the positions in the Technical Coordination Center of the Semi-Automatic Ground Environment (SAGE) system and presents implications for training requirements and personnel plans. The general procedures were: 1) review the maintenance coordination concept for SAGE, 2) develop position definitions, 3) make a chart tracing data flow from specific displays back to input equipment, and emphasize available check and test points as an example of a proposed job support to aid in malfunction isolation, and 4) use job requirements to infer training requirements. T. R 33

MacKey, D. R. (Chm.). INTERNATIONAL EDUCATIONAL TELEVISION SEMINAR. Oct. 1957, 42pp. School of Public Relations and Communications, Boston University, Boston, Mass.

This report contains selected papers given at the first International Seminar on

Educational Television. They are: address of welcome, J. Wendell Yeo (Boston University), "Television and Education--1957," John K. Weiss (Fund for the Advancement of Education), "The Hagerstown TV Project," T. Wilson Cahall (Maryland), "Television as a Means of Instruction for Credit in Pittsburgh," Charles Hettinger, "Television as a Means of Instruction for Credit in St. Louis," Earl Herminghaus, "Television as a Means of Instruction for Credit in Chicago," John W. Taylor, and "Television as a Means of Instruction in the College Classroom," Thomas Clark Pollack (New York University). T. R 7

14, 119

Bredon, Ruth W. PROFICIENCY TEST RESULTS IN THE SAGE TECHNICAL TRAINING DEPARTMENT: IDENTIFICATION OFFICER. ERC Proj. 46, Contract AF 41(657) 95, Proj. 1975, Task 76892, OAL TM 58 9, Sept. 1958, 7pp. Educational Research Corporation, Cambridge, Mass.

The Identification Officer Test was given to 15 examinees. The test contains four parts: 1) requires decisions similar to those required on the job, 2) and 3) provide diagnostic information on identification regulations, track and air movements data, etc., and 4) requires the examinee to choose and operate switches when told what action to perform. The scores on each item are presented in tabular form and compared for the different groups of examinees. Further development of the test is indicated. T.

14, 121

Bredon, Ruth W. RESULTS OF PROFICIENCY TESTING AT ESS: IDENTIFICATION TECHNICIAN. ERC Proj. 46, Contract AF 41(657) 95, Proj. 1975, Task 76892, OAL TM 58 3, Sept. 1958, 7pp. Educational Research Corporation, Cambridge, Mass.

The Identification Technician Test, developed for evaluation and training, was administered to six examinees. It contains four parts: 1) items designed to test the examinee's ability to make decisions similar to those on the job, 2) those concerned with identification regulations, 3) those concerned with knowledge of symbology, 4) those concerned with switch actions. Types of errors and types of items missed were tabulated and discussed. Further test development is indicated. T.

14, 122

Broadbent, D.E. CLASSICAL CONDITIONING AND HUMAN WATCH-KEEPING. APU 175, 1953, 9pp. Applied Psychology Research Unit, MRC, Cambridge, England.

It is the main thesis of this paper that classical conditioning derives its chief interest and importance from the fact that it reduces learning to a much less central position than any other form of animal experiment.

Two principles are derived from mathematical and experimental evidence: that only certain aspects of the total stimulus situation can initiate complex responses at one time, and stimuli possessing intensity, biological importance and novelty are most likely to be selected at any time. The Pavlovian situation and certain experiments on human beings, such as watch-keeping and the pacing of factory work, are interpreted in terms of these principles. R 34

14, 124

Brooks, W.D. DEVELOPMENT OF PROTOTYPE PROFICIENCY TESTS FOR SAGE OPERATORS: MANUAL DATA INPUTS PERSONNEL. ERC Proj. 46, Contract AF 41(657) 95, Proj. 1975, Task 76892, AFCRC TN 58 66, Sept. 1958, 14pp. Educational Research Corporation, Cambridge, Mass.

The jobs of SAGE Manual Data Inputs personnel and a test to measure the proficiency of these operators are described. The test was administered to personnel from the Experimental SAGE Sector, the New York Air Defense Sector and to instructors and students of a SAGE training group. The test aimed to simulate actual work conditions and to require the examinee to make realistic decisions. Test results were analyzed with respect to internal consistency, validity and reliability. T.

14, 125

Brooks, W.D. RESULTS OF PROFICIENCY TESTING AT ESS: MANUAL DATA INPUTS PERSONNEL. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TM 58 6, Sept. 1958, 14pp. Educational Research Corporation, Cambridge, Mass.

The test results of 14 persons on prototype proficiency tests for Manual Data Inputs Personnel are summarized. The test, part of a program designed to develop off-the-job performance tests for system evaluation and training, contains five parts: one and two for the supervisor and three, four, and five for both supervisor and technician. Mean scores for each part are reported and grouped according to task. The results of the analysis of this information indicate that further test development should result in useful instruments for measuring proficiency. T.

14, 126

Brown, W.F. & Trites, D.K. ADAPTABILITY SCREENING OF FLYING PERSONNEL. EARLY FLIGHT BEHAVIOR AS AN INDEX OF SUBSEQUENT ADAPTABILITY TO FLIGHT TRAINING. 57 114, Aug. 1957, 21pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

To devise an early criterion of adaptability to primary pilot training, instructors' comments on the daily grade slips for the first ten instructional flights in the PA-18 light plane were analyzed, and a scoring system developed for evaluating comments. The reliability of the procedure and its validity as a criterion measure were determined in a series of experimental studies. The practical uses of the method are discussed. T. R 13

Caperson, R.C. & Channell, R.C. USE OF THE OPERATIONAL FLIGHT TRAINER. Contract NONR 1734(00), NAVTRADEV-CEN Proj. 20 L 6, NAVTRADEV-CEN TR 1734 00 1, May 1957, 65pp. USN Training Device Center, Port Washington, N.Y.

Instructor activity in an operational flight trainer (OFT) was studied for the purpose of improving the training capabilities of these devices. The study was confined to the P2V-5 and F9F-5 OFT's in the training command and in fleet training. Visits for observation and recording of instructor activity were made to eight installations. Sample problems designed to test the maximum capabilities of the trainers were conducted at several installations. Based on these observations, human engineering principles were applied to the findings to evaluate the present design of the instructor's station. Recommendations for design modifications, instructor training, training syllabus for use of the OFT, and consumer education are presented. T. 1.

Chambers, E.G. TRANSFER OF TRAINING: A PRACTICAL PROBLEM. Occup. Psychol., ca. 1956, 30(3), 165-168. APU 263/56 (Applied Psychology Unit, MRC, Cambridge, England.)

This paper discusses the need for more knowledge in the area of transfer of training which can be applied in practical situations such as 1) transfer of older people to different type jobs, 2) demands made by new machines, and 3) effects of automation. A list of references is included. R 55

Malami, C.A. & Lembeck, W. ARMY AIRCRAFT MAINTENANCE WORKSTAND, LOW-LEVEL. FINAL REPORT. Proj. 9 38 01 000, House Task 12.61, May 1958, 25pp. USA Transportation Research and Engineering Command, Fort Eustis, Va.

This report covers the testing and evaluation of a low-level workstand designed for use in Army aircraft maintenance. Engineering tests were conducted in the field with applicable aircraft. Observations were made to determine whether the stand would

increase ease of maintenance on certain aircraft and what modifications needed to be made to increase its efficiency. The workstand was compared with the present workstand used by the Army. Illustrations of its versatility in actual use are given and deficiencies are noted. T. 1.

Hesse, H. & Silverman, R. THE MANUAL TRACKING PROCESS IN THE PRESENCE OF COUNTERMEASURES. Contract AF 33(616) 3274, IAWR Rep. 58 4, July 1958, 55pp. Institute for Air Weapons Research, University of Chicago, Chicago, Ill.

The value of radar countermeasures depends upon how the radar operators respond to the degraded information provided them by radar. This report examines the response of the operators as limited by this information and by the time available for reaction. Among the concepts that are quantified is the efficient utilization of surveiller (operator) capability and decision processes for initiating and continuing interesting (penetrating) tracks and rejecting non-interesting (all other vehicles and countermeasures) tracks. A theory is developed for use as an evaluation tool in predicting the success of penetrator countermeasures to the defense radars. T. 1. R 1

Peters, R.W. MULTIDIMENSIONAL SCALING APPROACH TO THE DETERMINATION OF BASIC PSYCHOLOGICAL PARAMETERS FOR PURE TONES. Contract AF 33(616) 3644, Proj. 7231, Task 71701, WADC TR 59 201, April 1959, 34pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Mississippi Southern College, Hattiesburg, Miss.)

To evaluate the multidimensional scaling method of successive intervals for use in auditory areas where the dimensions are not well known, an investigation of the dimensionality of auditory perception of pure tones was made. The stimuli were 16 pure tones presented in all possible paired combinations to 39 observers who made judgments of similarity between the stimuli on a nine-point scale. Inter-stimuli distances were determined on the basis of the judgments and were analyzed mathematically to reveal the minimum number of dimensions necessary to account for the distances. The findings are discussed in relation to the validity of the method. T. G. R 12

Crawford, M.P. (Dir.). WHAT HUMRRO IS DOING. Res. Bull. 4, Dec. 1957, 52pp. Human Resources Research Office, George Washington University, Washington, D.C.

This report is fourth in a series of Research Bulletins by the Human Resources Research Office (HumRRO). It presents highlights of several studies in the fields of training, motivation, and leadership which were completed or current during the fiscal year ending 30 June 1957. A bibliography of HumRRO reports published during this period is included (14 technical reports, 4 special reports, 1 research bulletin).
T. G. I. R 19

14, 141

Cyr, C., Thune, L.E. & Ericksen, S.C. STUDIES IN TRANSFER LEARNING: EFFECT OF METHODS OF INSTRUCTION ON OPERATOR PROFICIENCY. Contract NONR 2149(01), Tech. Rep. 1, Nov. 1957, 30pp. Department of Psychology, Vanderbilt University, Nashville, Tenn.

To determine the relative effectiveness of two contrasted methods of instruction on the learning, retention, and transfer of complex operator skills, standard automatic calculators (Friden and Marchant) were used as simulators for complex military equipment which requires technical operation. Four groups of 20 subjects were used as follows: 1) rote training (direct practice), 2) conceptual training (paper and pencil exercises stressing general principles of operation), 3) two control groups. Pre-training familiarization was given on both machines. Scores on proficiency test (immediately after training), retention test (following day) and transfer test (on Marchant) were analyzed for differences between the two methods. T.

14, 142

Daniel, R.S., Eason, R.G. & Dick, R.D. RELIABILITY OF THE MAP-MATCH METHOD FOR ASSESSMENT OF NAVIGATOR PERFORMANCE IN RADAR BOMBING. Contract AF 18(600) 1052, Proj. 7711, Task 47003, AFPTRC TN 57 121, Oct. 1957, 12pp. USAF Operator Lab., Randolph AFB, Tex.

The map-match method for assessing navigator performance in radar bombing was examined experimentally for reliability. Scoring of 206 individual scope photographs from 27 bomb runs taken from a Strategic Air Command evaluation mission was completed by an experienced map-match operator. One week later, the same photographs were rematched. Evaluation of the degree of reproducibility was made by 1) correlating the two sets of scores in terms of azimuth and ranging components, and by 2) the method of absolute discrepancies between crosshair positioning between them. The second method was also applied to sets of scores obtained by different operators. G. I. R 3

14, 143

Denenberg, V.H. A PROCEDURE TO OBTAIN ACCURATE MI KNOWN-DISTANCE

SCORES. USA Human Research Unit No. 1, Fort Knox, Ky.

A procedure is described which was developed to assist in obtaining unbiased known-distance scores when firing the M-1 rifle. The advantages of this method are discussed. I.

14, 144

Gordon, Mary A. INTERACTION OF EXPERIENCE AND APTITUDE IN PREDICTING SUCCESS IN TRAINING COURSES FOR AIRPLANE AND ENGINE MECHANICS. Proj. 7719, Task 17008, AFPTRC TN 57 133, Nov. 1957, 11pp. USAF Personnel Lab., Lackland AFB, Tex.

This report presents the results of some studies exploring the effect of background factors on the prediction of success in Air Force training courses for Airplane and Engine Mechanics. Biographical measures of mechanical experience and cultural status of the home were tried out in combination with verbal and mechanical aptitude tests and years of education to predict final grades in mechanical training. Urban and rural groups were treated separately. The effect of background differences in mechanical experience was studied at successive stages in training. Implications of the findings for improved prediction are discussed. T. R 5

14, 149

Grodowitz, W. METHOD OF ALLOCATING MILITARY PERSONNEL BY SKILL WITHIN THE AIR PROVING GROUND COMMAND. Working Paper 9, May 1957, 11pp. USAF Office of Operations Analysis, Eglin AFB, Fla.

This report describes a mathematical model for allocating military personnel in shortage skills within the Air Proving Ground Command (APGC). Basic assumptions and methodology used in computing 1) United States Air Force relationship of precedence category and personnel priority designator (PPD) and 2) relationship between command PPD and average PPD for selected primary mission units in APGC, are detailed. The technique used is intended to supplement other methods such as careful study, judgment, logic, and intimate familiarity with command functions, and the like. G.

14, 150

Hanes, R.M. & Goldbeck, R.A. A STUDY OF HUMAN FACTORS IN THE OPERATION OF THE NIKE AJAX SYSTEM. PART I: TRAINING PROBLEMS AND REQUIREMENTS. PART II: THE "SHOOTING TEAM"-RECOMMENDED OPERATING PROCEDURES. Task CLASSIC 1, Tech. Rep. 51, Nov. 1958, 73pp. Human Resources Research Office, George Washington University, Washington, D.C.

A critical need exists for the development of standardized training procedures and of proficiency measures for guided missile personnel. This report details the beginning phase of a program designed to meet this need—a survey of training problems and an analysis of Nike Ajax team procedures. The survey was conducted through observations and discussions during a series of visits to various installations and defense areas. The analysis of team procedures was accomplished through the summarization and integration of operating procedures employed in Pittsburgh, New York, and Chicago areas. A new set of recommended procedures was developed. T. I. R 4

Kinkade, R.G. & Kidd, J.S. THE EFFECT OF PROCEDURAL VARIATIONS IN THE USE OF TARGET IDENTIFICATION AND AIRBORNE POSITION INFORMATION EQUIPMENT ON THE PERFORMANCE OF A SIMULATED RADAR APPROACH CONTROL SYSTEM. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 58 624, May 1959, 18pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Aviation Psychology Lab., Ohio State University & The Ohio State University Research Foundation, Columbus, Ohio).

To explore the interaction effects of an airborne position information (API) display with the display of target identification, two experimental steps were used with ten laboratory-trained controllers. Several variations in the procedures and system configurations (such as use of ground reference points and fixed approach paths) were also compared and evaluated. A variety of measures of system efficiency (delay time, fuel consumption, go-arounds, etc.) and of safety (separation errors) formed the data for analysis. T. I. R 9

Drucker, A.J. ABSTRACTS OF PRB RESEARCH PUBLICATIONS FY 1958. PRB Tech. Res. Note 96, Sept. 1958, 28pp. USA Personnel Research Branch, Adjutant General's Office, Washington 25, D.C.

This report identifies both by publication serial number and by Research and Development Research Task all research publications prepared and released by the Personnel Research Branch of The Adjutant General's Office in fiscal year 1958. The listing includes four Technical Research Reports, 19 Technical Research Notes, 25 Research Memorandums, and two Research studies. Abstracts are given for the majority of the publications giving principal research findings. R 50

Matfess, W. & Brill, M. DEVELOPMENT OF GLOVE, PROTECTIVE, IMPERMEABLE, E18. Proj. 4 80 04 013 02, CWL Rep. 2204, Dec. 1957, 54pp. Protective Development Div., USA Chemical Warfare Labs., Army Chemical Center, Md.

To develop an impermeable glove which would afford protection against toxicological agents and provide greater manual dexterity than the M3 neoprene glove now in use, a developmental program was carried out. Various commercially available polymers were tested and a method for compression molding the glove from the selected material (butyl rubber) was devised. The method then was tested for commercial feasibility, three pairs of compression molds were built, and factory runs of 1000 gloves were produced from each mold. Acceptability tests were then made. T. I.

Estes, H.D. ADAPTABILITY SCREENING OF FLYING PERSONNEL. A LONGITUDINAL STUDY OF THE SOMATOTYPE IN MILITARY FLYING. 57 139, Nov. 1957, 30pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

To investigate the relation of the somatotype to military flying achievement, a group of 1,646 Army Air Force cadets for whom somatotype data were obtained on entering primary pilot training in 1943 was followed up through military personnel record files during 1954. Follow-up data included 1) present military status, discharge information, 2) success or failure in flying training if undertaken, 3) reason for flying training failure, if applicable, 4) accidental death in aircraft and/or combat action, 5) prisoner-of-war status, 6) psychiatric disturbances during military service, and 7) psychiatric or bad conduct discharge. These data were studied in all possible combinations with the somatotype data. T. G. I. R 49

Hopkinson, R.G. & Bradley, R.C. A STUDY OF GLARE FROM VERY LARGE SOURCES. A17/144/19, Note E 887, March 1959, 20pp. Building Research Station, Garston, England.

In view of the increasing tendency to the use of large sources in lighting practice a detailed study of the effect of very large sources on glare discomfort was undertaken. This report describes experimental conditions and procedures. Some first results are also presented. The source of luminance was such that it could be varied from apparent source size of 10^{-3} steradians up to full visual field and over a

wide range of luminances. The experiments used small numbers of experienced subjects and were conducted by means of the Multiple Criterion Method with the subject in control. Equal glare curves are shown for various experimental conditions.
G. I. R 15

14, 161

Fiedler, F. E. LEADER ATTITUDES AND GROUP EFFECTIVENESS. FINAL REPORT. Proj. NR 170 106, N6 ORI 07135, Aug. 1957, 69pp. University of Illinois Press, Urbana, Ill.

This monograph summarizes the findings of a six-year research program designed to identify psychological factors underlying group effectiveness. Its specific aim was the development of a theory regarding the part which interpersonal perception plays in making groups productive. The study is divided into three fairly distinct parts: 1) mathematical studies examining problems of measuring similarity between persons (both perceived and real), 2) development of interpersonal perception tests for group testing and rapid scoring, and 3) relating interpersonal perception measures to group performance criteria. The study was concerned with "natural" groups such as bomber crews and managements of consumer cooperatives. 1. R 39

14, 163

Fleishman, E. A. & Friedman, M. P. THE DEVELOPMENT OF THE AIR FORCE AURAL CODE TEST. Proj. 7706, Task 27002, AFPTRC TN 57 131, Nov. 1957, 42pp. USAF Operator Lab., Lackland AFB, Tex.

Improvement of procedures for selecting airmen for radio operator training has been a persistent problem in the Air Force program. This report describes the background, rationale, development, and standardization of the Air Force Aural Code Test which is now operational and is weighted as two-thirds of the Radio Operator Aptitude Index. The test consists of two parts: discrimination of auditory rhythmic patterns, and learning three Morse Code letters. Successive revisions and the unique test construction problems involved are described in detail. Complete instructions to examiners and to examinees, and the conversion tables used operationally are provided. T. G. R 11

14, 167

Goffard, S. J. DEVELOPMENT OF A MEASURE OF SKILL AT RECEIVING INTERNATIONAL MORSE CODE. May 1957, 35pp. Human Resources Research Office, George Washington University, Washington, D. C.

To establish a method for measuring skill at receiving International Morse Code

which would have more flexibility and generality than is shown by percentage of correct responses at a given speed (the method now in use), a series of progress tests was constructed. A series of tables for use in determining "speed scores" from the raw scores (per cent correct) was constructed. A trial run of the raw progress tests and associated tables for them was made on students in the Army's High Speed Radio Operation (052) Course, Southeastern Signal School at Fort Gordon, Georgia. The resultant data were analyzed in terms of learning curves and factors affecting learning. Comparisons between the new and old methods are made. T. G. R 7

14, 169

Horowitz, M. W. & Wells, C. F. HUMAN FACTORS IN MAINTENANCE. PART 1. AN INVESTIGATION OF MAINTENANCE PROBLEMS OF A REPRESENTATIVE TRAINING DEVICE. Contract N61339 74, Proj. 20 OS 23, NAVTRADEVEN TR 20 OS 23 1, Jan. 1958, 33pp. USN Training Device Center, Port Washington, N. Y.

This report presents the results of a two-week situational investigation to ascertain maintenance problems as they affect human factors. A representative training device (15V6) was selected for investigation. A visit was made to a Naval Air Station to study the maintenance problems and obtain information pertaining to such factors as: down-time relative to utilization-time; areas and causes of breakdown, problems of maintenance personnel relative to maintenance work; distinctions among part failure, design failure, and human failure; and opinions of personnel on minimizing maintenance problems. Examination of records, questionnaires, observations, and consultations provided the data for analysis. T.

14, 172

Havron, M. D., Gorham, W. A., Nordlie, P. G. & Bradford, R. G. TACTICAL TRAINING OF THE INFANTRY RIFLE SQUAD. Task SQUADTRAIN, HumRRO Subcontract 650 017, Tech. Rep. 18, June 1955, 116pp. Human Resources Research Office, George Washington University, Washington, D. C.

To develop training methods and procedures to increase the effectiveness of infantry rifle squads, four methods of training were developed: 1) Control, 2) Group Participation, 3) Combat Fundamentals, and 4) Team Training. A different group of eight squads was trained by each method by Army instructors. Effectiveness of the different methods was evaluated using scores on performance tests given immediately following training and opinions of trainees, instructors, and research staff. The best elements of all methods were then combined into a Final Training Program and used to train 48 squads,

14, 174

16 of which were trained by instructors with no previous experience with the project. Comparisons of performance were made with that of squads trained by Army methods.

T. G. I. R 9

14, 174

Myers, J. STUDY OF A PHOTOSYNTHETIC GAS EXCHANGER AS A METHOD OF PROVIDING FOR THE RESPIRATORY REQUIREMENTS OF THE HUMAN IN A SEALED CABIN. Rep. 58 117, Nov. 1958, 17pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Lab. of Algal Physiology, University of Texas, Austin, Tex.).

To study some of the basic problems of a photosynthetic gas exchanger as a method of providing the respiratory requirements of human occupants of a closed chamber, a small model gas exchanger utilizing *Chorella pyrenoidosa* at 25 degrees Centigrade was developed. A series of experiments was conducted measuring the efficiency of the exchanger in producing oxygen and removing carbon dioxide during continuous operation over a period of seven to 15 days. Technical improvements in design are discussed.

T. G. I. R 10

14, 176

Hick, W. E. "DISCONTINUITY AND THE HUMAN OPERATOR OF MACHINE CONTROLS". APU 67/47, June 1947, 16pp. Applied Psychology Research Unit, MRC, Cambridge, England.

This paper presents a tentative discussion of the problem of the continuity (or discontinuity) of human response. The main question is what aspects of the response are continuous and what are discontinuous, with the object being to arrive at an answer that will be of practical use in the design of machines, instruments, or vehicles to be controlled in this manner. The major topics of the paper are continuous time functions, input-output continuity, types of operator discontinuity, refractory phase, and intermittency in tracking. T. I. R 6

14, 177

Hick, W. E. AN EXPERIMENT ON RIFLE AIMING. APU 51/46, Aug. 1946, 12pp. Applied Psychology Research Unit, MRC, Cambridge, England.

A simple and economical photographic method of recording the movements of a rifle during aiming and trigger-pulling (without live rounds) is described. Recommendations for use and limitations of the equipment and method are made. Preliminary trials were made on a small number of subjects ranging in skill from complete beginners to experts. Certain tentative conclusions are drawn, and possible lines of further investigation are suggested. Some points of more general interest arising from the work are mentioned,

such as the mode of operator functioning. G. I. R 1

14, 178

Holt, H. O., (Chm.). REPORT OF CONFERENCE ON RIFLE MARKSMANSHIP TRAINING RESEARCH. 24-25 June 1953, 86pp. USA Office, Chief of Army Field Forces, Fort Monroe, Va.

In 1950 the Department of the Army established a survey and research project to determine where marksmanship and gunnery training could be improved and the expenditures of training ammunition curtailed through use of existing and new training devices. This document reports a conference of the research personnel and representatives of the agencies that plan, supervise, and execute M1 rifle training. Included in full are reports on 1) comparison of whole and part methods of training, 2) obtaining accurate scores on the known distance range, 3) experimental evidence for improvements in training methods, and evaluation of a special live-firing trigger-squeeze exercise. Recommendations based upon the findings are included. T. G. I. R 4

14, 179

Nasbrook, A. H. (Dir.). AVIATION CRASH INJURY RESEARCH. ANNUAL REPORT. Contract NONR 401(21), Nov. 1958, 13pp. Aviation Crash Injury Research of Cornell University, Phoenix, Ariz.

This report covers the first year of AV-CIR's (Aviation Crash Injury Research of Cornell University) operation in its new location in Phoenix, Arizona. AV-CIR objectives and tasks are listed and the general program of accident investigations, evaluations of aircraft and aircraft components, publications, meetings and conferences are reported. R 6

14, 180

Horowitz, M. W. & Wells, C. F. ANALYSIS OF COCKPIT MOTIONS NEEDED FOR OPERATIONAL FLIGHT TRAINERS. Contract N61339 294, Proj. 20 OS 51, ERC Proj. 49 4, Letter Order 4, Dec. 1958, 57pp. Educational Research Corporation, Cambridge, Mass.

To evaluate motion platforms in Operational Flight Trainers (OFT) as training aids, the following methods were used: 1) a review of the literature was made on discrimination of motion, acceleration, gust, displacement, tilt, etc.; 2) visits were made to four facilities that were either doing research on or were using a motion platform in training; 3) informal opinion samples were taken of expert personnel at above facilities; and 4) a personal evaluation was made of the "flying characteristics" of two OFT's incorporating motion platforms. A list of relevant

training tasks that can be adequately simulated is given; recommendations are included. R 96

14, 181

Kugris, Violette A. RESULTS OF PROFICIENCY TESTING AT ESS: INITIATION SUPERVISOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TM 58 4, Sept. 1958, 11pp. Educational Research Corporation, Cambridge, Mass.

The Initiation Supervisor Test was administered to eight persons at the Experimental SAGE Sector. The test contains three parts: 1) decision-making situations, switch actions and procedures, speed determination, 2) situations requiring priority of decisions and actions, 3) items on knowledge of symbology and selector switches. Scores were obtained and analyzed. T.

14, 182

Kugris, Violette A. DEVELOPMENT OF PROTOTYPE PROFICIENCY TESTS FOR SAGE OPERATORS: TRACK INITIATOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, AFCRC TN 58 63, Sept. 1958, 21pp. Educational Research Corporation, Cambridge, Mass.

A proficiency test for the Track Initiator was constructed that required the examinee to make decisions similar to those required on the job. This trial version was given to 68 persons. The results indicate the potential value of the instrument. Recommendations for refinement of the test are made. T. R 4

14, 183

Kugris, Violette A. DEVELOPMENT OF PROTOTYPE PROFICIENCY TESTS FOR SAGE OPERATORS: INITIATION SUPERVISOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, AFCRC TN 58 65, Aug. 1958, 17pp. Educational Research Corporation, Cambridge, Mass.

A proficiency test (for the Initiation Supervisor) was developed "to provide estimates of the operators' ability to solve typical problem situations by applying specific knowledges and procedures." The test was constructed following a detailed job analysis of this position. It was administered to 57 individuals—operators, instructors, and students in the SAGE program. The results are indicative of the potential value of a more refined test. T.

14, 187

Jones, E.R. & DiVall, R.H. FUNCTIONAL SUITABILITY TEST OF THE F-151/F-100A FIXED GUNNERY TRAINER. PHASE VI. AFPTRC TN 57 96, July 1957, 113pp. USAF Operator Lab., Randolph AFB, Tex.

The F-151 Fixed Aerial Gunnery Trainer is an attachment that provides a visual display for fighter-type flight simulators and is designed to teach pilots air-to-air and air-to-ground attacks. This report (1) describes the device's capabilities and limitations for training, (2) suggests training and proficiency measurement uses, and (3) recommends certain improvements and applications. A demonstration of the usefulness of the device was given by training both experienced and inexperienced F-100A pilots under close supervision. During its operational use, a systematic examination and evaluation of physical characteristics and accuracy of simulation were made. T. G. I. R 8

14, 189

Gaito, J., Hanna, T.D., Bowe, R. & Greco, S. ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS. PART 3. PERFORMANCE AND HABITABILITY ASPECTS OF EXTENDED CONFINEMENT. TED NAM AE 1403, NAMC ACEL 385, Sept. 1958, 52pp. USN Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Penn.

To determine the effects upon performance of seven days of confinement in a small area with an oxygen concentration equivalent to 55 per cent at sea level, six men were studied under the above conditions. Tasks of three types (simple psychomotor, simple judgment, and complex psychological) were performed on schedule throughout the period; intellectual aptitude tests were given before and after the run; and a habitability questionnaire was filled out by each subject after the run. Performance data were analyzed for the effect of time spent in the confined area and the effect of type of function sampled. Recommendations are included. T. G. I. R 9

14, 190

Kelley, C.R., Bowen, H.M., Ely, J.H. & Channell, R.C. TRACKING TRAINING II: A CASE HISTORY. NAVTRADEV-CEN TR 1908 00 2, March 1958, 38pp. USN Training Device Center, Port Washington, N.Y.

To study the process of learning to track under different conditions, a representative tracking task (submarine depth control) was chosen. An analog computer was adopted to serve as a training device. The authors first trained themselves, observed their own learning processes and developed an actual training program. Three subjects were trained according to the program and three control subjects received equivalent periods of loosely supervised practice. Performance was observed and measured. The results provide general

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information about the problem of how to train men to track with specific procedures and devices for the task studied.

T. G. I. R 1

14, 191

Kelley, G.J., Jr., Nuessle, H.C. & Duston, A.G. ELECTRONICS TRAINING FOR OBSERVERS. Proj. XXII, May 1954, 31pp. USAF Senior Observer Section, Mather AFB, Calif.

To determine the amount and content of electronics training to be presented in graduate and undergraduate aircraft observer training, factors bearing on the problem (criteria for training, facts of present course content, assumptions basic to training, and definitions) were outlined. Information gathered included the history of electronics instruction in aircraft observer training, training requirements of operational using agencies, student opinions, field-grade aircraft observer opinions, observations at an Air Force base, future needs, and requirements for understanding current in-flight maintenance manuals. This information was analyzed and recommendations made.

T. R 10

14, 192

Preston, J.E. THE EFFECT OF DEPRESSANT DRUGS AT ALTITUDE. FINAL REPORT. Contract NONR 222(29), Proj. NR 112 363, 14pp. School of Pharmacy, University of California Medical Center, San Francisco, Calif.

The effects of two central nervous system depressants (pentobarbital sodium (PBS) and codeine) were studied *in vivo* at sea level and at altitude. PBS effects were also studied *in vitro*. Oxygen and phosphate metabolism were studied using the conventional manometric techniques. Acute toxic effect of the drugs *in vivo* was estimated and determinations carried out at sea level and at altitude. Rats were used as subjects in this study.

T. R 47

14, 193

USN Research Laboratory. INTERACTIONS BETWEEN DISPLAY GAIN AND TASK-INDUCED STRESS IN MANUAL TRACKING SYSTEMS. Proj. NR 401 000, Task NR 401 001, NRL Prob. Y02 03, Aug. 1958, 5pp. USN Research Lab., Washington, D.C.

To determine how the performance of man-machine systems is affected by factors that stress or overload the human operator, five systems, all of which had the same dynamics but differed in display magnification (compensatory position control tracking), were employed. Five operators were given considerable practice on each system, after which they were required to control the systems under a series of stressful conditions: secondary tasks, incompatible display-control

conditions, two-hand tracking, two-coordinate tracking. Performance was measured as system error and display error. The results are discussed in relation to man-machine systems.

T. G. I. R 6

14, 194

Lyman, J. (Proj. Leader). ARM PROSTHESIS RESEARCH. Contract V1005M 2075, Rep. 59 44, July 1958 - June 1959, 28pp. Dept. of Engineering, University of California, Los Angeles, Calif.

This report summarizes: 1) a series of basic studies to establish body control sites for possible application to externally powered prostheses, e.g., evaluation of biceps cineplasty as a control source, 2) an analysis of bioelectrical phenomena for externally powered prostheses, 3) physiological investigations of amputee temperature regulation, 4) an evaluation of pertinent electronic data acquisition and handling equipment, 5) an evaluation of methods of measurement of stump pressure, and 6) some selected applications research studies. The project was a continuation of basic engineering studies of human body sensory mechanisms and motor control to establish more maximal prosthetic design criteria.

R 14

14, 195

Lichtenstein, M. STUDIES IN HUMAN CONTROL DYNAMICS. NRL Rep. 805, Oct. 1957, 36pp. USN Electronics Lab., San Diego, Calif.

This study was conducted to obtain: 1) general observations on operator control characteristics, 2) a survey of operator performance in simulated control systems, and 3) evaluations of data analysis techniques. These were done in both compensatory and pursuit experimental tracking situations. Situations in which the error of the concept of "the" human operator transfer function is apparent are described. Inverse transfer-function performance, operator time instability, operator phase characteristics and frequency characteristics, operator error tolerance, and so forth are discussed in terms of control-display relationships. Conclusions and recommendations are set forth.

T. G. I. R some

14, 196

Laymon, R.S. RELATIONSHIP BETWEEN FLAVOR AND PHYSICO-CHEMICAL PROPERTIES OF COMPOUNDS. Contract DA19 129 QM 1141, Proj. 7 84 15 007, Prog. Rep. 1, May 1958 - April 1959, 7pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (Battelle Memorial Institute, Columbus, Ohio).

This is a progress report on a research program designed to discover physical and/or chemical properties of odorants which account for the psychological classification of

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odorants and to obtain psychological data on adaptation rate and cross-adaptation effects. Results on the following items are summarized: survey of literature, design of experiment, construction of apparatus, data on chemicals to be used, and estimated expenditures. T. R 13

14,198

Lamson, B.G., Billings, Martha S. & Bennett, L.R. LATE EFFECTS OF TOTAL-BODY ROENTGEN IRRADIATION. LONGEVITY AND INCIDENCE OF NEPHROSCLEROSIS AS INFLUENCED BY PARTIAL-BODY SHIELDING. Rep. 59 33, May 1959, 14pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (School of Medicine, University of California, Los Angeles, Calif.)

Two hundred forty-two female Wistar rats were observed throughout their life span following 1000 roentgens hypoxic total-body or partial-body irradiation. Animals that died within 30 days of irradiation were excluded from the study of late radiation effects. Autopsies were performed after death. The observations and analyses include: 1) duration of survival after whole and partial body irradiation, 2) retardation of growth, 3) autopsy observations of disease, tissue changes, and the like. T. G. R 7

14,201

Kugris, Violette A. RESULTS OF PROFICIENCY TESTING AT ESS: TRACK MONITOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TM 58 8, Sept. 1958, 11pp. Educational Research Corporation, Cambridge, Mass.

The Track Monitor Test was administered to 23 persons at the Experimental SAGE Sector. The test consists of three parts: 1) decision-making situations and switch actions and procedures, 2) situations requiring priority of decisions and actions, 3) areas of knowledge such as symbology, reading of Georef, information obtained by use of various selection switches. Scores were obtained and analyzed. T.

14,202

Kugris, Violette A. PROFICIENCY TEST RESULTS IN THE SAGE TECHNICAL TRAINING DEPARTMENT: INITIATION SUPERVISOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TM 58 10, Sept. 1958, 11pp. Educational Research Corporation, Cambridge, Mass.

The Initiation Supervisor Test was administered to 44 persons at the SAGE Technical Training Department. The test contains three parts: 1) items to test decision-making, correct switch actions and procedures and determination of the speed of a track, 2) not reported in this document, 3) items that

test knowledge of symbology and switch selector information. Scores were obtained and analyzed.

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Kugris, Violette A. PROFICIENCY TEST RESULTS IN THE SAGE TECHNICAL TRAINING DEPARTMENT: TRACK INITIATOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TM 58 13, Sept. 1958, 9pp. Educational Research Corporation, Cambridge, Mass.

The Track Initiator Test was administered to 33 persons at the SAGE Technical Training Department. The performance was analyzed on specific items and groups of items. The groups consisted of diagnostic items relating to specific knowledge areas in which the examinee should be competent in order to make the correct decisions. Other items measured specific skills and knowledges not related to decision-making. The results demonstrated possible areas for additional training. T.

14,204

Kugris, Violette A. RESULTS OF PROFICIENCY TESTING AT ESS: TRACK INITIATOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TM 58 7, Sept. 1958, 18pp. Educational Research Corporation, Cambridge, Mass.

The Track Initiator Test was administered to 27 persons at the Experimental SAGE Sector. The test has four parts: 1) decision-making situations, switch actions and procedures, speed determination, symbology, 2) knowledge such as symbology, reading Georef, 3) picture of display scope containing items needing action, 4) items concerning the priorities of actions. Scores were obtained and the results analyzed. Several areas for further investigation are indicated. T.

14,207

Landahl, H.D. & Williams, C.M. REPRESENTATION OF MODALITY IN CUTANEOUS SENSIBILITY. Bull. Math. Biophysics, 1958, 20, 309-315. AFOSR TN 58 313. (University of Chicago, Chicago, Ill. & University of Texas, Austin, Tex.).

This paper describes how the same free nerve terminals in the skin which subserve warmth and cold sensibility can also give rise to touch, prick, itch and sharp pain sensations when appropriately stimulated. The description is in terms of both discrete and continuous theories of neuron interaction. A simple network of McCulloch-Pitts neurons is constructed to illustrate how peripheral mechanisms could discriminate between thermal and mechanical stimuli. 1. R 7

14, 208

Kopra, L. L., Pedrini, D. T. & Fullington, R. W. RELATIVE HEARING LEVELS AND TYPES OF HEARING LOSS AMONG FOUR SELECTED GROUPS OF AIR FORCE PERSONNEL. Rep. 59 51, April 1959, 11pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas, Austin, Tex.).

To investigate the relative hearing levels of right and left ears in four groups of Air Force personnel: 1) 25 non-noise-exposed Class A, 2) 25 noise-exposed Class A, 3) 50 noise-exposed Class B, 4) 25 noise-exposed Class C, pure tone air-conduction and bone-conduction tests were administered. Air-conduction thresholds were established at: 250, 500, 1000, 1500, 2000, 4000 and 6000 cps; bone-conduction thresholds at 250, 500, 1000, 2000 and 4000 cps. A comprehensive history was obtained by interview. Data on awareness of a preferred or better ear also were obtained. Median and mean thresholds for right and left ears were calculated. Chi square and t test were employed to study threshold differences. The data were analyzed also to establish the incidence of different types of hearing loss among Class B and C. T. G. R 9

14, 209

Kraus, R. N. AN EVALUATION OF PATIENTS SUSPECTED OF HAVING NOISE-INDUCED HEARING LOSS. Review 4 59, June 1959, 16pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

This paper reports the evaluation of 77 U. S. Air Force flight-line personnel with defective hearing. For each person the following information was obtained: medical history, occupational history, family history, physical examination, hearing tests, estimate of actual noise exposure, and presbycusis. On the basis of the audiometric tests, these personnel were diagnosed as to type of defect. For that type now suspected of resulting from prolonged exposure to noise, detailed extracts of these audiograms are included. The difficulties in determining whether defective hearing in a specific patient is caused or aggravated by noise exposure are discussed. T. G. R 17

14, 210

Adams, O. S., Levine, R. B. & Chiles, W. D. RESEARCH TO INVESTIGATE FACTORS AFFECTING MULTIPLE-TASK PSYCHOMOTOR PERFORMANCE. Contract AF 33(616) 6550, Proj. 7184, Task 71582, WADC TR 59 120, March 1959, 37pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

To study 1) the 24-hour test-retest reliability and intercorrelation of a battery of seven performance tasks (four monitoring,

arithmetic computation, tracking, and pattern perception) and of four psychophysiological variables (heart rate, breathing rate, skin resistance, and skin temperature), 2) the effects of performing simultaneously various combinations of physically compatible tasks, and 3) the relation of psychophysiological criterion measures to performance criteria and to conditions of task presentation, fifteen subjects were tested. The data were analyzed by correlational techniques. T. G. R 25

14, 211

Andrews, T. B. & Hackman, R. COMMUNICATIONS AND READABILITY. HBM 200/1 App. 13, June 1951, 11pp. US Research and Development Board, Department of Defense, Washington, D. C. (University of Maryland, College Park, Md.).

The problem of military communication is analyzed in terms of factors affecting efficient communications: (1) sensory channel used, (2) rate of handling by recipient, (3) training of recipient, (4) method of transmission and presentation, and (5) limiting conditions such as noise or irrelevant information. The critical problem is specification of adequate criteria of communicability. Suggestions for improvement of communication systems, aside from the mechanical characteristics of the system, are discussed. Readability and its relation to communications are discussed. R 19

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Anderson, C. D. THE CONSTANT-RATIO RULE AS A PREDICTOR OF CONFUSIONS AMONG VISUAL STIMULI OF BRIEF EXPOSURE DURATION. Contract AF 19(604) 1962, AFCRC TN 58 60, May 1959, 27pp. Hearing and Communication Lab., Indiana University, Bloomington, Ind.

To explore the generality of the constant-ratio rule (for a given stimulus, the ratios of response proportions are independent of the number of stimuli being discriminated), and experimental examination of the rule as a predictor of confusions among visual stimuli was made. Four highly practiced subjects were tested with two subsets of three monosyllabic five-letter words (master set was made up of all six words) presented under very brief visual exposure. Obtained responses were compared with predicted responses and discussed in relation to findings from applications of the rule to other sense modalities (auditory). T. G. R 10

14, 214

Pondy, L. R. SUMMARY REPORT ON AVAILABLE METHODS FOR EVALUATING MAN-MACHINE SYSTEMS. Sept. 1959, 47pp. Battelle Memorial Institute, Columbus, Ohio.

This report attempts to present a representative sample of the few existing unclassified quantitative methods applicable to the study of man-machine systems. This area of study is defined and distinguished from human engineering. Its methods of study are indicated--the experimental, procedural and theoretical techniques which permit the description, representation, simulation or investigation and subsequent evaluation of such systems in order that output may be related to the various independent variables. To discuss these methods within the context of problem solution, the main body of the report consists of abstracts of the papers which reported them. Comments and additional notes, in some cases, are appended. I. R 34 (approx.)

14, 215

Narisi, S. L. TIME OF FALL IN LOW ALTITUDE ESCAPE. OCO Proj. TSI 15, DA Proj. 502 06 001, FA Subproj. C101, Memo. Rep. 664, Dec. 1957, 10pp. Frankford Arsenal, Pitman-Dunn Laboratories Group, Philadelphia, Penn.

This study is aimed at investigating the time of free fall of a man ejected from a fast-moving airplane as a function of his initial position and initial vector velocity. From the statistics on survival as related to altitude, a theoretical curve showing survival probability as a function of time is presented. The main section is devoted to identifying and specifying the important parameters - air speed, angle of elevation, bank angle, catapult velocity and drag - as a function of time for some representative low altitudes. Each of these is developed mathematically and conclusions are set forth as to best theoretical conditions for survival. I.

14, 216

Berens, C. (Chm.). MINUTES AND PROCEEDINGS OF THE THIRTY-FOURTH MEETING OF THE ARMED FORCES-NRC VISION COMMITTEE. APRIL 1-2, 1954. Secretariat, Armed Forces--National Research Council Committee on Vision, Dept. of Physics, University of Florida, Gainesville, Fla.

These minutes and proceedings present in full 15 papers that deal with various aspects of visual research, four reports of working groups of the Committee (Armed Forces Vision Tester, visual standards, midshipman myopia, Armed Forces Visual Acuity Charts, visibility at high altitudes), and abstracts of 14 research studies produced during 1953. T. G. I. R 100 (approx.)

14, 217

Berens, C. (Chm.). MINUTES AND PROCEEDINGS OF THE THIRTY-FIFTH MEETING OF THE ARMED FORCES-NRC VISION COMMITTEE. NOVEMBER 3-5,

1954. Secretariat, Armed Forces--National Research Council Committee on Vision, Dept. of Physics, Univ. of Florida, Gainesville, Fla.

These minutes and proceedings give a full account of some 17 papers and presentations covering the field of vision. Abstracts of 15 research reports produced in 1954 are included. T. G. I. R 80 (approx.)

14, 218

Beldam, E. M. A STUDY TO DETERMINE AN OPTIMUM ALTIMETER PRESENTATION. LAM 59/2, May 1959, 17pp. RCAF Institute of Aviation Medicine, Toronto, Ontario, Canada.

To carry out a laboratory evaluation of the IAM (Institute of Aviation Medicine, RCAF, Toronto) experimental altimeter dial, it was compared with the Kollsman Counter-Pointer dial. Twenty-four aircrew Flight Cadets made forty readings of each dial while carrying on a routine task. The dials were operating during the trials. The criteria were time to read and errors (number and magnitude). These data were analyzed for differences in performance on the two dials. T. I. R 4

14, 219

Bishop, E. W., Winterberg, R. P. & Channell, R. C. HUMAN ENGINEERING REVIEW OF THE RADAR SYSTEM AN/MPQ 29. Contract DA 36 039 SC 73253, Proj. 3 99 00 100, Task Order 15B, May 1959, 16pp. Dunlap and Associates, Inc., Stamford, Conn.

The AN/MPQ-29 Radar System has been reviewed primarily as a system for tracking and plotting friendly aircraft making maximum use of an airborne beacon. Characteristics of the system which would affect its suitability as the radar tracking component of a drone control system were considered. Human factors involved in systems operation were reviewed. Recommendations are made for improving the efficiency of the present unit and redesigning future units for more complex missions.

14, 220

USN Office of Naval Research. PROGRAM FOR DEVELOPMENT OF INTEGRATED PRESENTATION OF FLIGHT INFORMATION. Jan. 1953, 32pp. USN Office of Naval Research, Washington, D. C.

This article outlines a project aimed at producing systems for simplified and more adequate presentation of data for high performance, supersonic and all weather flight. The two major phases of this project are: 1) feasibility studies and improvement of existing components and 2) long range study for greatly simplified displays integrated with automatic control equipment. These phases are dealt with in some detail. Further, the kind of organization to handle such a development program is indicated. I.

14, 221

14, 221

Byrnes, V. A. (Chm.). MINUTES AND PROCEEDINGS OF THE THIRTY-THIRD MEETING OF THE ARMED FORCES-NRC VISION COMMITTEE. Nov. 1953, 208pp. Armed Forces-National Research Council Committee on Vision, University of Florida, Gainesville, Fla.

These minutes and proceedings present in full 19 papers that deal with various aspects of visual research, four reports of working groups of the Vision Committee, a bibliography of dark adaptation (417 references), and 13 abstracts of unclassified research reports produced during 1952-1953. T. G. I. R 500 (approx.)

14, 222

Holland, G. E. & Emmons, B. W. COMPARATIVE TESTS ON THREE DIMENSIONAL DISPLAYS. Rep. 1-50, July 1947, 14pp. USAF Air Materiel Command, Cambridge Field Station, Cambridge, Mass.

This report describes tests made on four types of two dimensional static displays in order to determine which is preferred for presentation of three dimensional data; the third dimension being indicated by size of target, color of target, length of radial line or stereoscopic presentation. Fifty observers selected targets for a period of two minutes by marking the targets on a sheet in the ascending order of altitude. Number of correctly selected targets is indicated. T. 1.

14, 223

Chernikoff, R., Bowen, J. H. & Birmingham, H. P. A COMPARISON OF ZERO-ORDER AND FOURTH-ORDER AIDED COMPENSATORY SYSTEMS AS A FUNCTION OF COURSE FREQUENCY. NRL Prob. Y02 01, Proj. NR 401 000, Task NR 401 002, NRL Rep. 5262, Jan. 1959, 7pp. Applications Research Div., USN Research Lab., Washington, D. C.

This study compared closed-loop man-machine control system performance between a zero-order system (no integrators in the loop) and an aided fourth-order system (four integrators in the loop), using complex course inputs over a wide range of frequencies. A compensatory tracking task, consisting of a cathode-ray tube (crt) display and a handwheel control to move a marker dot along the horizontal coordinate of the crt face to keep it in coincidence with a vertical reference line at center, was used. Six subjects served as trackers. Mean error scores were analyzed for effects of systems and frequencies. The findings are compared with deductions from servomechanism and human engineering theory. T. G. R 3

14, 224

Hirsch, J. A. DEVELOPMENT OF AN IMPROVED AIR FORCE SUNGLASS. Proj. 6332, Task 63609, WADC TR 58 278, Aug. 1958, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

The factors which rendered the F-2 and G-2 sunglasses unacceptable are briefly discussed. The experimental sunglass, designed for service testing is described. Improvements resulting from field usage leading toward the ultimate standardization of a new sunglass, the HGU-4/P, are presented. A complete summary of improvements included in the new specification is given. I.

14, 225

Coleman, P. D. CORTICAL CORRELATES OF AUDITORY LOCALIZATION. Science, July 1959, 130, 39-40. (Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.).

To test the validity of a place principle in auditory localization, responses were recorded simultaneously from a number of electrodes on the auditory cortex of one hemisphere of cats. Click stimuli were used, and changes in the magnitudes of the responses recorded from each of six electrode locations were explored as a function of stimulus changes in real location (moving the source in space) and apparent location (changing the binaural time interval while holding the binaural intensity ratio constant). G. R 4

14, 226

Cox, J. A. & Mullins, C. J. EVALUATION OF LIGHT PLANE TRAINING AMONG AFOTC STUDENT OFFICERS. Proj. 7719, Task 17109, WADC TN 5943, July 1959, 6pp. USAF Personnel Lab., Lackland AFB, Tex.

To evaluate several aspects of the Air Force ROTC Flight Instruction Program (FIP) after the first year as an experimental program, cadets completing the program at 41 institutions were studied. Successful progress and completion confirmed by a series of progress check rides was used as a criterion of success in a study of the relation between FIP and pilot stanine from AFOQT (pilot aptitude test). A sample of 37 non-FIP trained were matched with a sample of FIP trained detachments and were compared as to proportions entering preflight training and proportions eliminated from primary pilot training. T.

14, 227

Culbert, S. PHYSICAL CHARACTERISTICS OF LEAFLETS: A SURVEY OF THE LITERATURE. Contract AF 33(038) 27522, HRRI "Project Revere," Res. Memo. 21,

Jan. 1954, 17pp. USAF Human Resources Research Institute, Maxwell AFB, Ala. (Dept. of Psychology, University of Washington, Seattle, Wash.).

This memorandum, dealing with desirable physical characteristics of the airborne leaflet used in psychological warfare operation, is based upon a survey of research literature. Topics covered are 1) factors and conditions in leaflet design and perception and 2) findings on physical characteristics of leaflets (paper and printing). Appendices contain 1) languages using the Latin alphabet, 2) relative visibilities of some 8-point type, 3) legibility of color combinations, and 4) the bibliography. T. R 53

14, 228

Pattishall, E. G., Banghart, F. W., Brown, G. E. & Hadley, R. P. BIBLIOGRAPHY OF DECOMPRESSION SICKNESS. Contract AF 18(600) 1792, ARDC TR 58 60, Dec. 1958, 65pp. Division of Educational Research, University of Virginia, Charlottesville, Va.

This bibliography represents a thorough review of all the major medical and biological abstracting and indexing sources available from 1946 through August 1958. There also is a comprehensive subject listing which was derived almost entirely from titles. R 875 (approx.)

14, 229

Miller, J. W. & Ludvigh, E. J. TIME REQUIRED FOR DETECTION OF STATIONARY AND MOVING OBJECTS AS A FUNCTION OF SIZE IN HOMOGENEOUS AND PARTIALLY STRUCTURED VISUAL FIELDS. Contract NONR 568(00), Proj. NR 142 023 & BuMed Surg Proj. NM 17 01 99, Subtask 2, Rep. 15, May 1959, 18pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To determine the time necessary for detecting spherical targets subtending visual angles of 10.00, 12.34, 17.45, 29.55 and 59.13 minutes of arc in homogeneous and partially structured visual fields, three subjects were required to locate the target, when stationary, or locate and indicate the direction of the target, when moving. The latter procedure was employed in both unstructured and partially structured fields. Size and position of target and structure of visual field were randomized in the experimental sessions. Results are discussed in terms of the position sense of the eye and a method for determining probability of successful search (i. e. detection) is formulated. G. 1. R 13

14, 230

Miller, A. E. & Replogle, E. H. DEVELOPMENT OF AN EMERGENCY PRESSURIZATION SYSTEM FOR AN ESCAPE CAPSULE. Contract AF 33(616) 5005, Proj. 6352, Task 63105, WADC TR 58 397, May 1959, 41pp. USAF Aero Medical Lab.,

Wright-Patterson AFB, Ohio. (Scott Aviation Corporation, Lancaster, N. Y.).

This is a design study of a self-contained emergency pressurization system for an escape capsule in which three prototypes were developed, built and tested. Primarily this report discusses the more controversial aspects of the design, the mistaken assumptions, changes found necessary, application of previously developed "Aneroid Motors", test results and knowledge gained that may be useful to future designers. Also included is some analytical design data. G. 1.

14, 231

Eisen, L. & Zeigen, R. S. A SUPINE SEAT FOR HIGH-STRESS TESTING OF PRIMATES. Proj. 7222, Task 71749, WADC TR 59 165, April 1959, 18pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report summarizes the design rationale of a supine seat and restraint harness, with surrounding enclosure, for high stress bio-science experiments with primates. The equipment is intended for test under various abnormal stresses including high g centrifuge runs. Other uses for the equipment are suggested. A brief description of an earlier supine test seat and restraint harness for low-stress experiments using a squirrel monkey is included. T. 1.

14 232

Emanuel, I., Alexander, M., Churchill, E. & Truett, B. A HEIGHT-WEIGHT SIZING SYSTEM FOR FLIGHT CLOTHING. Proj. 7214, Task 71739, WADC TR 56 365, April 1959, 109pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

This report presents a height-weight sizing system for use by designers and fitters of flight clothing. The observations and recommendations reported here are based on a re-analysis of the body size data of the 1950 Anthropometric Survey of Air Force flying personnel. Pairs of dimensions were correlated with other dimensions important to clothing design to find the pair yielding the highest correlation. Practical and statistical problems in developing a sizing system are discussed and tables of body dimensional data are presented for several basic size programs. The choice and application of the programs are discussed in detail. T. 1. R 18

14, 233

Emanuel, I., Alexander, M. & Churchill, E. ANTHROPOMETRIC SIZING AND FIT-TEST OF THE MC-1 ORAL-NASAL OXYGEN MASK. Contract AF 33(616) 3841, Proj. 7214, Task 71728, WADC TR 58 505, March 1959, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

A sizing program for oral-nasal oxygen masks, based on total face length and lip length, has been developed through a re-analysis of the 1950 USAF Anthropometric Survey head and face data. Face forms, based on the sizing program, have been constructed for use in preparation of such masks. The MC-1 Oxygen Mask, an oral-nasal, pressure-demand type mask, has been fabricated in accordance with the sizing program and the face forms. Fit-tests on 150 subjects have been conducted. The theoretical and practical aspects of the sizing procedure are discussed in this report. Design limits and suggested procurement tariffs for each of the six proposed sizes are given. T. I. R 6

14, 234

Ernst, A. A. FEASIBILITY STUDY FOR A MAN-MACHINE SYSTEMS RESEARCH FACILITY. Delivery Order AF (33 616) 56 10, Proj. 7184, WADC TR 59 51, March 1959, 245pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report presents the results of a study of the feasibility, design, and cost of a large-scale laboratory facility for research on man-machine problems. Postulates of the study were 1) need for an optimal division of labor among men and machines in complex weapons systems, 2) orientation toward functional rather than physiological and psychological factors of the human environment, and 3) possibility of employing dynamic simulation of such systems. Feasibility was judged through designing, implementing, and operating a scale model of the desired facility. The characteristics required of the equipment, its cost, and conclusions as to how well the design objectives might be met are presented. 1.

14, 235

Merenda, P. F. & Macaluso, C. J. A CRITICAL ANALYSIS OF THE FIRE CONTROLMAN - FIRE CONTROL TECHNICIAN MERGER IN THE U. S. NAVY. Tech. Rep. 30, Aug. 1956, 11pp. USN Examining Center, Great Lakes, Ill.

To investigate differences in basic and inherent qualities between two groups (Fire Controlman and Fire Control Technician ratings in the U. S. Navy) which have been merged into one (FT), random samples were drawn from the Navy-wide population of candidates for advancement in FT rating in the February 1956 series of examinations. The sample was then divided into 1) pure Fire Control Technicians and 2) integrated Fire Control Technicians (former Fire Controlmen). Examination standard scores and Navy standard scores on three tests (General Classification, Arithmetic, and Mechanical) were analyzed by multiple regression techniques for differences between

the two groups. The findings are discussed in relation to the merging of these groups. T. R 2

14, 236

Evrard, E., Bergeret, P. & van Wulfften Palthe, P. M. (Eds.). MEDICAL ASPECTS OF FLIGHT. (THE UNEXPLAINED AIRCRAFT ACCIDENT). AGARDograph 30, 1959, 308pp. Pergamon Press, New York, N. Y.

The increasing performances of modern aircraft give to flight safety a more and more important role. Since the human element is still an essential feature in the operation of an aircraft and the origin of aircraft accidents, the Advisory Group for Aeronautical Research and Development (AGARD) Aeromedical Panel devoted two symposia to this subject. This book presents a selection of 30 reports under the following chapter headings: 1) Flight safety and aircraft accidents, 2) Unexplained aircraft accidents, 3) Use of pathology in crash injuries, 4) In-flight protection, and 5) Some special problems. T. G. I. R 200 (approx.)

14, 237

McCleary, R. A. THE NATURE OF THE GALVANIC SKIN RESPONSE. Psychol. Bull., March 1950, 47(2), 97-117. (Johns Hopkins University, Baltimore, Md.).

In this paper the problem of what physiological changes give rise to the galvanic skin response (GSR) is considered. After a brief discussion of methodology, the history of research on the nature of the GSR is reviewed. The period covered is primarily from 1932 to 1950, although significant papers prior to 1932 are included. Three points of view are presented and discussed critically: the vascular theory, the secretory theory, and the muscular theory. R 84

14, 238

USA Aviation Board. OPTIMUM PANEL ARRANGMENT OF FLIGHT INSTRUMENTS FOR ARMY FIXED-WING AIRCRAFT. REPORT OF PROJECT NR AVN 1557.5. Proj. NR AVN 1557.5, Rep. ATDEV 6 452/4, Dec. 1958, 6pp. USA Aviation Board, Fort Rucker, Ala.

To determine for Army fixed-wing aircraft optimum panel arrangements for 1) basic flight instruments, 2) instruments currently in use, and 3) integrated instrument systems, an analytic study of the factors underlying the problem was made. After arriving at an arrangement of the basic instruments which satisfied all the factors, optimum arrangements for (2) and (3) were determined during flight tests under actual and simulated conditions. Optimum arrangements are recommended. 1. R 1

14, 239

Thomson, R. M., Covner, B. J., Jacobs, H. H. & Orlansky, J. ARRANGEMENT OF GROUPS OF MEN AND MACHINES. CHAPTER VIII OF HUMAN ENGINEERING GUIDE TO EQUIPMENT DESIGN. Contract NONR 1798(00), ONR Rep. ACR 33, Dec. 1958, 127pp. USN Office of Naval Research, Washington, D.C. (Dunlap and Associates, Inc., Stamford, Conn.).

This report is a draft of a chapter to be incorporated in the Human Engineering Guide to Equipment under the direction of the Joint Services Steering Committee. It is concerned with the layout of compartments (size and shape, grouping of personnel, traffic flow, and environmental conditions) and the arrangements of major equipment components (location of displays, location of controls, plotting and status boards, and location of maintenance spaces). The major concern is to provide information for the effective design and use of systems that require several (or many) pieces of equipment and two or more operators. T. 1. R 26

14, 240

Trumbull, R. & Maag, C. H. BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS. SUPPLEMENT NUMBER 5: JULY 1958 - JULY 1959. July 1959, 13pp. USN Physiological Psychology Branch, ONR, Washington, D.C.

This bibliography contains titles of specific research tasks and technical reports issued during the period July 1958 to July 1959. The items appear under the project headings: sensory mechanisms, perception and orientation, neural basis of behavior, response mechanisms and high intensity noise. R 141 (approx.)

14, 241

Tolles, W. E. & Carbery, W. J. A SYSTEM FOR MONITORING THE ELECTROCARDIOGRAM DURING BODY MOVEMENT. Contract AF 33(616) 5473, Proj. 7222, Task 71751, WADC TR 58 453, April 1959, 42pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Airborne Instruments Lab., Division of Cutler-Hammer, Inc., Mineola, N. Y.).

This investigation was undertaken to develop a system for monitoring the electrocardiogram during body movement. Two new lead systems were devised and tested; a new stainless-steel mesh electrode was designed and methods for placement investigated; and ways to eliminate interference from muscle potentials and base-line shift were worked out. T. G. I.

14, 242

Kidd, J. S. A COMPARISON OF ONE-, TWO-, AND THREE-MAN CONTROL UNITS

UNDER VARIOUS CONDITIONS OF TRAFFIC INPUT RATE. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 59 104, June 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (The Ohio State University & The Ohio State University Research Foundation, Columbus, Ohio).

To determine effect of input load and team size upon performance of the particularly complex task of radar air traffic control, nine laboratory-trained controllers, operating as one-, two-, or three-man control units, guided returning aircraft arriving at intervals of 30, 60 or 90 seconds through the approach phase of flight from entry into the 50-mile radius control zone to Ground Control Approach turnover, ten miles from touchdown. A total of 54 problems were accomplished, six per session, each consisting of the arrival of 24 aircraft. The two measures of performance were system efficiency and safety. The results were analyzed by the Friedman two-way and the Kruskal-Wallis one-way analysis of variance. Predictions of two- and three-man team performance from individual scores were made. T. 1. R 20

14, 243

Karpovich, P. V. & Wilklow, L. B. A STUDY OF THE HUMAN FOOT IN STANDING AND WALKING. Contract DA 49 007 MD 889, Dec. 1958, 36pp. Department of Physiology, Springfield College, Springfield, Mass.

This is a study of foot pronation and supination in standing and in walking. For the stationary foot: 1) the supinating effect of the functional and conventional insoles was compared, 2) the effects of distance between feet, body weight distribution and heel height upon angle C (angle between lower leg and calcaneus) were studied and 3) the validity of the manual goniometer for measuring angle C was tested. For the foot in walking an electrogoniometer was developed, angle C during natural walking was studied, also effect of speed and length of step and effect of toeing-in and toeing-out were tested. T. 1. R 10

14, 244

Tyler, D. W., Fremming, B. D., Reid, J. B. & Elam, C. B. SOME EFFECTS OF CHLORPROMAZINE ON ACTIVITY. 58 150, April 1959, 5pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

To evaluate the activity level of the rhesus monkey after varying dosages of chlorpromazine, six normal male monkeys served as subjects. Three hours before observation, the animal was given an intramuscular injection of either a placebo or the drug (0.30, 0.55, 0.80, 1.05, and 1.65 milligrams per kilogram of body weight).

Observation of activity began one minute after the animal was placed in a cage containing stimulus objects and an automatic feeding device for delivering food at five-minute intervals. Four types of activity were evaluated: manipulation, location shift, visual activity, oral activity. The findings are related to the clinical use of this drug.
T. G. R 4

14,245

Van Valkenburg, S. & Warman, H. J. ATLAS OF MEAN DAILY MINIMUM TEMPERATURES. Proj. Ref. 7 83 01 005, Tech. Rep. EP 110, May 1959, 32pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass. (Clark University, Worcester, Mass.)

This report contains isotherms of mean daily minimum temperature at intervals of nine degrees Fahrenheit (five degrees Centigrade) for January, April, July, and October on 24 maps representing each continent except Antarctica. The isotherms are based on data from land stations only. G. R 5

14,246

Vogel, J. SUMMARIES OF RESEARCH REPORTED ON DURING CALENDAR YEAR 1958. Dec. 1958, 21pp. USN Medical Research Lab., Submarine Base, New London, Conn.

A summary of the research reports published during the calendar year 1958 in the Laboratory's regular chronological series is presented. Titles of reports issued in the memorandum series, articles published by members of the Laboratory staff in scientific journals, books, or proceedings of scientific societies are listed. R 60

14,247

Wasserman, P. & Silander, F. S. DECISION-MAKING. AN ANNOTATED BIBLIOGRAPHY. 1958. Graduate School of Business and Public Administration, Cornell University, Ithaca, N. Y.

This volume is designed to provide a carefully selected and annotated list of books, articles, and documents which will serve as a general and broadly conceived introduction to the study of decision-making. The period covered is primarily that from 1947 through September 1957. Only English language publications are included. A complete author and title index is included. The major classifications are: the decision-making process (general and theoretical), values and ethical considerations, leadership as a factor, psychological factors, decision-making in small groups, community decision-making, communications and information handling, mathematics and statistics in decision-making. R 32: (approx.)

14,249

Harrison, L. P. FINAL APPROACH VISIBILITY STUDIES. FISCAL YEAR 1952. PROGRESS REPORT. PART III. Proj. 4.14, D&T 21 6/1, Jan. 1954, 92pp. Weather Bureau, US Department of Commerce, Washington, D. C.

To explore the feasibility of using television for the determination of visibility in the instrument approach and landing zones of airports, a field experiment was conducted. On seven different occasions, each of six hours duration, a television camera was installed at the south end of the instrument landing runway and video signals were transmitted to a receiver in the Weather Bureau Airport Observatory. The visual range (V_r) as judged by an observer of the television picture was compared with V_r judgments of an end-of-runway observer, looking in the direction the nearby camera was oriented. A limited variety of meteorological conditions were experienced; both day and night tests were made. T. G. I. R 90

14,250

Webb, P. & Klemm, F. K. DESIGN OF VENTILATED CLOTHING. Proj. 7164. Task 71831, WADC TR 58 608, March 1959, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

The purpose of ventilated clothing is reviewed and the functions of convective and evaporative cooling are described. These functions are achieved by applying certain principles that are discussed in detail. Various ventilating garments are described to illustrate the evolution of the principles and an ideal ventilating system is defined for pressure suit assemblies. Tests are detailed which demonstrate the validity of each design principle employed in the ideal system. The general subjects of low energy ventilating systems and of integration of ventilated clothing assemblies are discussed. Recommendations are made for the use and design of ventilating systems for protective clothing. T. G. I. R 7

14,251

Hatch, H. G. Jr. EFFECTS OF WATER-LANDING IMPACT ON AN ORBITAL CAPSULE FROM THE STANDPOINT OF OCCUPANT PROTECTION. NASA TN D 39, Sept. 1959, 18pp. National Aeronautics and Space Administration, Washington, D. C. (Langley Research Center, Langley Field, Va.)

This investigation was aimed at determining the effects of water-landing on an orbital capsule, which has a conical-shaped body with a segment of a sphere as the landing surface, from the standpoint of human tolerance, in order to discuss the problem of protecting an occupant from the landing

42-139

14,256

impact. The instrumented capsule contained five accelerometers, each measuring accelerations at various axes; also different attitudes (representing swaying of parachute) were simulated. Tracings of acceleration and superimposed vibration were made during flight. These findings plus human tolerance data are discussed. G. I. R 3

14,252

Harcum, E. R. VISUAL DETECTION AND RECOGNITION OF TARGETS OF NON-UNIFORM LUMINANCE VIEWED AGAINST UNIFORM BACKGROUNDS. FINAL REPORT. Contract NOAS 57 623 D, UMRI Proj. 2643, Rep. 2643 2 F, Oct. 1958, 11pp. Research Institute, University of Michigan, Ann Arbor, Mich.

To determine the effect on target detection and recognition of dependencies among units of luminance microstructure within the targets when the targets are composed of black and white cells presented against uniform black or gray backgrounds, these thresholds were obtained by the ascending method of limits on two experienced and two inexperienced observers for eight target forms each with three degrees of internal dependence. Threshold differences as a function of the aforementioned variables are discussed as well as the importance of these factors as informational cues. G. I. R 8

14,253

Williams, J. & Horvath, S. M. PULMONARY BLOOD VOLUME AND CIRCULATORY ALTERATIONS IN DOGS EXPOSED TO COMPENSATED HIGH INTRAPULMONARY PRESSURES. Contract AF 33(616) 5173, Proj. 7160, Task 71814, WADC TR 58 471, April 1959, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (State University of Iowa, Iowa City, Iowa).

To measure circulatory and pulmonary blood volume alterations that might occur if pressure breathing is compensated by adequate counterpressure, dogs were placed in full pressure suits and helmets and exposed to pressures from four to 230 millimeters mercury for periods ranging from two to 300 minutes. The data were studied for the effectiveness of the pressure suit for protection to the animal exposed to compensated high breathing pressures. T. I. R 34

14,254

Wolfe, A. S. & O'Connell, M. H. SOURCES OF VARIABILITY AMONG ARTICULATION TESTS FOR NORMAL EARS WITH PB WORD LISTS. 58 123, March 1959, 6pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

To determine 1) the effects of sound pressure levels of 90, 100, 110 and 115 decibels on articulation test scores, 2) the effects of order of presentation of test forms

on test scores, and 3) the reliability of tests performed at each presentation level, four forms of the Harvard Phonetically Balanced (PB) word test were arranged in an appropriate design. The subjects were 64 Air Force recruits ranging in age from 17 to 25 years and with normal hearing within the frequencies 500, 1000, and 2000 cps. The findings are discussed in relation to the use of the PB test lists as screening tests of speech perception efficiency. T. R 12

14,255

Harcum, E. R. & Blackwell, H. R. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD. XI IDENTIFICATION OF THE NUMBER OF BLACKENED CIRCLES. Proj. MICHIGAN, Rep. 2144 314 T, Dec. 1958, 24pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

This is one of a series of experiments investigating an observer's ability to identify targets composed of multiple elements having one of two possible forms (binary elements). A linear array of open and closed circles were presented tachistoscopically at four inclinations on the frontal plane of the visual field, with each array passing the observer's fixation point. The task was to estimate the number of closed (blackened) elements that appeared on either side of fixation. Error data from 20 observers were analyzed for meridians as a whole and for half-meridians. T. G. I. R 9

14,256

Guedry, F. E., Jr. & Ceran, S. J. DERIVATION OF 'SUBJECTIVE VELOCITY' FROM ANGULAR DISPLACEMENT ESTIMATES MADE DURING PROLONGED ANGULAR ACCELERATIONS: ADAPTATION EFFECTS. Proj. 6 95 20 001, Task USAMRL T 4, MEDEA, Rep. 376, Feb. 1959, 21pp. USA Medical Research Lab., Fort Knox, Ky.

To describe the change in intensity of subjective reaction (magnitude of subjective velocity) during periods of prolonged constant angular accelerations varied in magnitude from one trial to next and to determine the nature of any response decline during the course of constant-magnitude stimulus, ten subjects made estimates of angular displacement by indicating direction of apparent rotation of a target light (in dark room) and signalling each time they apparently rotated through 45 degrees. Four angular velocities were used: 0.5, 1.0, 1.5, and 2.0 degrees per second squared for 100, 100, 70, and 55 seconds respectively. The results are discussed in terms of predictability by Van Egmond's "torsion-pendulum" theory, adaptation effects, and so forth. T. G. I. R 20

14, 257

Farnsworth, D. PSYCHOLOGICAL STUDIES OF AGING IN ENGLAND. ONRL TR 54 59, June 1959, 9pp. USN Office of Naval Research, London, England.

This report describes studies which are being conducted in England on the problems of aging. The Nuffield Foundation sponsors exploratory studies on a wide front: the effect of educational facilities available to elderly people; pilot studies on their economic position; the possibilities of employment of older workers unable to carry on their normal work; aging performance in relation to complexity of task; the physiology of age; compensatory processes with age. Some of these studies are summarized briefly. G.

14, 258

Glassner, H. F. & Peters, G. A. EFFECTS OF MENTAL TASK DIFFICULTY ON PHYSIOLOGICAL RESPONSE. Engng. Paper 848, Aug. 1959, 24pp. Equipment and Safety Research, Douglas Aircraft Company, Inc., El Segundo, Calif.

To compare the measurements obtained on each of several physiological variables when level of intellectual difficulty of work tasks is systematically varied, such recordings were made on subjects performing problems drawn from the first, third and fifth difficulty levels of the Army General Classification Test. The physiological indices included respiratory, cardiac and skin resistance changes. A Latin square design was employed and therefore analysis of variance performed. Chi square also was used because of the nature of the assumptions necessary for the former technique. Discussion of these indicants and their potential for monitoring space crews, for determining operator loading factors, and so forth is included. T. I. R 7

14, 259

Gardner, R. E. & Carl, J. M. THE EFFECTS OF AMBIENT ILLUMINATION, CRT BIAS, AND NOISE UPON TARGET DETECTIBILITY WITH A B-DISPLAY. Projs. NA 433 003 & NE 091 600 2, NRL Rep. 5264, Jan. 1959, 8pp. USN Research Lab., Washington, D. C.

To determine the effects of: a wide range of ambient illumination, receiver gain, and cathode-ray-tube bias on target detectability for a typical airborne-intercept radar B-display, four male subjects detected targets on such a display in a cockpit mock-up for several intensities, receiver noise values and target positions. Optimum values as a function of ambient illumination are indicated, and related to other findings in this area. G. I. R 5

14, 260

Frank, W. E. & Gibson, R. J. A NEW PRESSURE-SENSING INSTRUMENT. J. Franklin Inst., July 1954, 258(1), 21-30. (Bioengineering Section, Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.).

This report describes work done developing a system for measuring pressure exerted by the individual on his environment. The instrument had to function so accurate pressure contours could be drawn, particularly in the areas of bony prominences. The experiments included testing of different materials particularly for reducing hysteresis and instrumentation. Specific applications for this device are indicated. G. I.

14, 261

Dzendolet, E. & Rievley, J. F. MAN'S ABILITY TO APPLY CERTAIN TORQUES WHILE WEIGHTLESS. Proj. 7184, Task 71586, WADC TR 59 94, April 1959, 28pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This study first reviews the anthropological literature to determine the torques a man can apply under normal conditions. Three experiments were performed in order to determine these torques under frictionless conditions: 1) maximum torque person can exert while trying to supinate his hand, 2) reaction force to a torque applied to a handhold (pushes and pulls) with handle varied through four positions and 3) qualitative observations on person performing two simple mechanical acts. The values obtained empirically were compared to calculated values and the validity of predictions so based was indicated. Suggestions concerning optimum body positions, use and location of handholds, design of handtools, and so forth are made. T. G. I. R 8

14, 262

Fryer, D. I. AIRCRAFT PASSENGER-SEAT DESIGN AND CRASH SURVIVAL. FPRC 1055, Aug. 1958, 17pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

This review of available information describes the forces likely to be encountered in an aircraft accident and the best means by which to minimize their various effects on passengers. The discussion of protective engineering includes the floor, seat anchorage, and seat orientation. Major attention is given to the arguments advanced for and against the adoption of backward facing seats. T. R 46

14,263

Dunlap and Associates, Inc. INTEGRATED INSTRUMENTATION FOR AIRCRAFT. HUMAN ENGINEERING PHASE. Dec. 1954, 51pp. Dunlap and Associates, Inc. Stamford, Conn.

This is a summary of the findings of the first year studies in the program to improve and simplify aircraft instrument presentation. An analysis was made of the visual cues which provide information for flight control during contact flight. These were incorporated in a single display which appears adequate for presenting data related to orientation of the aircraft in space. A series of aircraft tests for evaluating this display and comparing it to a standard and an advanced display system are described. Plans for further development of this display concept are indicated. I.

14,264

Garvey, W. D., Taylor, F. V. & Newlin, E. P. THE USE OF "ARTIFICIAL SIGNALS" TO ENHANCE MONITORING PERFORMANCE. NRL Prob. R05 19, Proj. NO 010 520, NRL Rep. 5269, Feb. 1959, 8pp. Applications Research Division, USN Research Lab., Washington, D. C.

To explore the behavior of human monitors searching over a two-hour period for signals that appear infrequently, five experiments were run using a multi-dial display. The variables were 1) use of artificial signals indistinguishable from the real signal, 2) use of artificial signals readily distinguished from real signal, 3) informative feedback (red light) and 4) motivational feedback (noise). The response times to the real signals were analyzed for effects of the variables on monitoring efficiency. T. G. I. R 10

14,265

Cummings, E. G., Blevins, W. V., Greenland, C. M. & Craig, F. N. THE EFFECT OF PROTECTIVE MASKS ON THE SOLDIER'S ABILITY TO RUN A HALF MILE. Subproj. 4 08 02 023 01, CWLR Rep. 2254, Oct. 1958, 20pp. USA Chemical Warfare Labs., Army Chemical Center, Md.

To assess the effects of the E13 and M9 gas masks on the soldier's ability to perform intensive work demanded by assault maneuvers, half-mile speed running was performed by nine paratroopers. Each subject ran the half-mile single while wearing the E13 mask (with and without the filter), the M9 mask (with and without the filter), and with no mask. Each run was separated by 24 hours. Running times, per cent increase in running time (as based on the no mask condition), final heart rates, and the statistical analysis of the data are given. The effects of mask-weight distribution,

inspiratory resistance, and visual field on running are discussed. T. R 6

14,266

Hale, H. B., Ellis, J. P., Jr. & Kratochvil, C. H. CHANGES IN PLASMA CORTICOSTEROIDS AND BICARBONATE AS A RESULT OF PILOTING SUPERSONIC AIRCRAFT. 59 61, April 1959, 4pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

The present study is concerned with hyperventilation in F-100 pilots. Plasma bicarbonate determinations provide a means of detecting in-flight hyperventilation, and, in theory, corticosteroids determinations might differentiate the susceptible from the tolerant ones. Such determinations were made immediately before and after relatively short flights. Comparison was made of instructors and students to ascertain whether the difference in flying is reflected by these parameters. T. R 10

14,267

Hall, F. G. & Salzano, J. EFFECT OF BODY POSTURE ON MAXIMAL INSPIRATORY AND EXPIRATORY STROKE VOLUME. Contract AF 33(616) 3821, Proj. 7164, Task 71832, WADC TR 59 128, March 1959, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Duke University Medical Center, Durham, N. C.).

To enable a close study of respiratory processes, a method for measurement of both inspiratory and expiratory stroke volumes is described. Timed maximal expiratory and inspiratory stroke volumes were measured, using the method described, in 18 normal young men ranging in age from 19 to 30 years. During these tests, subjects were placed in four postures: standing, supine, head up and body axis at 45 degrees from horizontal, and head down and body axis at 45 degrees from horizontal. The percentage of maximal stroke and flow rates were analyzed in relation to body posture. T. G. I. R 3

14,268

Crugnola, A. M. & Robinson, H. M. MEASURING AND PREDICTING THE GENERATION OF STATIC ELECTRICITY IN MILITARY CLOTHING. Proj. 7 93 18 019, Rep. 110, Sept. 1959, 67pp. USA Textile Dyeing Laboratory Branch, QM Research & Engineering Center, Natick, Mass.

This report contains: 1) a summary of an investigation on the problem of static electricity in clothing assemblies from the standpoint of hazard due to characteristics of the clothing components, 2) an analysis of the generation of static electricity and of specific atmospheric and other conditions under which the problem becomes acute, 3) data

from on-the-individual tests of static electricity on men wearing cold-dry uniforms, 4) data from an evaluation of antistatic finishes for effectiveness and durability, 5) instrumental methods for predicting electrostatic propensity are reviewed, and 6) a new Quartermaster device for the aforementioned predictions is described and discussed. T. G. I. R 44

14, 269

Crockford, G. W., Hellon, R. F., Humphreys, P. W. & Lind, A. R. AIR-VENTILATED SUITS FOR WEAR IN VERY HOT ENVIRONMENTS. RNP 59/944, CES 439, CP 33, Jan. 1959, 18pp. Clothing Panel, Climatic Efficiency Sub-Committee, RNP/RC, London, England.

The object of the research was to provide an air-ventilated suit which would enable a man to carry out light watch-keeping duties for one or two hours in an environmental condition of 180 degrees Fahrenheit dry-bulb temperature and 130 degrees Fahrenheit wet-bulb temperature. Tests, described in this report, were conducted to determine the optimum quantity and temperature of the ventilating area for the suit. Sixteen tests were carried out in an air temperature of 178 degrees Fahrenheit during which volunteer subjects wore the suit ventilated with dry air at given rates between ten and 25 c. f. m. (cubic feet minute) and at given temperatures between 86 and 100 degrees Fahrenheit with a constant humidity. Physiological measurements were made before, during, and after the tests. Recommendations are included. T. G. R 3

14, 270

Melpar, Incorporated, Falls Church, Va. STUDY OF EVALUATORS FOR AIRCRAFT INSTRUMENTATION DISPLAY. FINAL REPORT. Contract NR DA 36 039 SC 75578, Proj. NR 11 00 0000, Task 11 57 0081, USAEPG SIG 950 41, June 1958, 58pp. USA Electronics Proving Ground, Fort Huachuca, Ariz.

To determine the feasibility of fabricating a flight simulator for testing developmental aircraft instrumentation; to determine its probable acceptability, value and cost; and to determine, if feasible, concepts and doctrines for employment, studies were made of the evaluation problem, the "pros" and "cons" of "In-flight" versus simulator testing, basic analog computer operations, and how simulator techniques could be used. A computer and associated laboratory facility are described in detail and the experimental techniques to perform instrument display evaluation are discussed. Comparative cost estimates of simulator testing and flight testing are presented. G. I. R 17

14, 271

Conklin, R. M. (Chm.). DESIGN ENGINEERING. A DISCUSSION OF TRAINING IN VALUE ANALYSIS SELECTION OF ENGINEERING MATERIALS MINIATURIZATION TRENDS RECOGNITION AND REWARDS FOR INVENTIONS. May 1956, 68pp. The American Society of Mechanical Engineers, New York, N. Y.

This bulletin contains eight papers and discussions from a Design Engineering Conference held in May 1956, in conjunction with a Design Engineering Show. Four technical sessions were held: Value analysis in product design; How to get and train design engineers; Selecting materials and miniaturization problems; and Patents-recognition, reward and rights. T. I.

14, 272

Hickam, J. B. & Frayser, Regina. PHOTOGRAPHIC MEASUREMENT OF RETINAL VENOUS BLOOD OXYGEN. VALUES IN NORMAL SUBJECTS, AND THE EFFECT OF CHANGE IN BODY POSITION AND IN THE INHALATION OF LOW AND HIGH OXYGEN MIXTURES. 58 155, Feb. 1959, 12pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Duke University School of Medicine, Durham, N. C.)

A method is described for measuring by photographic means the percent oxygen saturation of retinal venous blood. Results obtained from normal subjects under various conditions (breathing 10 and 100 percent oxygen, seated and recumbent positions) are presented and discussed. T. G. I. R 6

14, 273

Cohen, W. SOME PERCEPTUAL AND PHYSIOLOGICAL ASPECTS OF UNIFORM VISUAL STIMULATION. Contract DA 49 007 MD 866, Jan. 1959, 19pp. University of Buffalo, Buffalo, N. Y.

Three major problems were investigated: 1) the extent to which the accuracy of form recognition is dependent upon the structure of the visual field, the structure of the object, and prolonged exposure (90 seconds) to the visual field; 2) the dependence of spatial orientation on field structure, characteristics of the target, and subject's set; and 3) the effects of prolonged exposure (20 minutes) to the uniform field upon the "blank-out" (or "white-out") phenomenon which involve temporary loss of vision. T. R 8

14, 274

Hulburt, E. O. (Chm.). MINUTES AND PROCEEDINGS OF THE FIRST MEETING OF THE ARMY-NAVY-NRC VISION COMMITTEE. SUBCOMMITTEE ON VISIBILITY AND ATMOSPHERIC OPTICS. 26-27 JANUARY 1948. Armed-Forces-NRC Vision Committee, Washington, D. C.

This document reports the minutes and proceedings of a meeting of the Subcommittee on Visibility and Atmospheric Optics with a group of civilian scientists to consider the Navy's problems in visibility. Reports of five current research studies were made: Penn State Atmospheric Optics Program, tests of atmospheric shimmer, meteorological research program of the Daniel Guggenheim Airship Institute, atmospheric polarization, and visual thresholds. Brief reports from various working groups are summarized. G. I. R 20 (approx.)

14, 275

Hunt, D. P. TRACKING PERFORMANCE AS A FUNCTION OF FEEDBACK SPECIFICITY. Proj. 7184, Task 71580, WADC TR 58 584, March 1959, 32pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

To provide knowledge concerning the relationship between human performance and the specificity of feedback information, four degrees of specificity and two levels of task difficulty were studied in terms of their effect on error and on control motion in the performance of a one-dimensional compensatory tracking task using an acceleration control. Eight subjects were assigned randomly to each of eight combinations of task difficulty and feedback specificity and performed 30 90-minute trials. Tracking error and control motion scores were analyzed to find an optimum degree of specificity of feedback information. T. G. I. R 8

14, 276

Chapin, J. L. MAINTENANCE OF ACCLIMATIZATION BY RE-EXPOSURE TO ALTITUDE. Rep. 59 23, June 1959, 13pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Medical School of the University of Colorado, Denver, Colo.).

To determine how well individuals who had attained natural acclimatization to altitude could maintain this by intermittent re-exposure to original altitude, 14 young healthy males were acclimatized to altitudes from 5250 to 14,160 feet for two and one-half to three weeks, then periodically re-exposed. Tests of acclimatization used were: closed- and open-circuit acute hypoxia test, exercise CO₂ accumulation test, resting and exercise hypoxic threshold test. The physiological implications of the test results are discussed. T. R 5

14, 277

Jerger, J. F. & Carhart, R. T. SOME RELATIONS BETWEEN NORMAL HEARING FOR PURE TONES AND FOR SPEECH. 59 43, April 1959, 12pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Northwestern University, Evanston, Ill.).

To determine the intensity difference between normal hearing for spondee words and for a 1000 cycle per second pure tone, a preliminary investigation employed ten sophisticated subjects well acquainted with test materials and ten naive subjects initially not acquainted with tests. Thresholds were obtained by two methods (up-and-down and clinical) and compared for effect of sophistication on the two thresholds. The main experiment, employing 96 young adults with normal hearing, investigated five factors: type test method, order of test administration, sex, ear, and familiarity with test vocabulary. The data were analyzed for differences attributable to these factors and for average differences between the two types of thresholds. T. I. R 14

14, 278

Johansson, G., Backlund, F. & Bergstrom, S.-S. LUMINANCE CHANGES AND VISUAL ACUITY. Rep. 5, March 1959, 22pp. Psychological Lab., University of Uppsala, Uppsala, Sweden.

To study the time lag in visual acuity after luminance changes, a series of three experiments was conducted. The luminances ranged from one to 10,000 millilamberts, the visual acuity tests were of the checker-board type, and the subjects numbered five, seven, and five for the several experiments. The luminances were presented 1) serially, 2) in random order, and 3) with inserted glares (duration of three and six seconds). The time lag data were studied as a function of preadaptation luminances for the three conditions of presentation. The implications of the findings for the operator in man-machine systems are discussed. T. G. I. R 9

14, 279

Chapanis, A. (Dir.). A REPORT OF RESEARCH UNDER CONTRACT WITH THE OFFICE OF NAVAL RESEARCH. Contract (NONR) 248(55), Prog. Rep. 1, May 1959, 12pp. Psychological Laboratory, Institute for Cooperative Research, John Hopkins University, Baltimore, Md.

This report of general research under contract with the Office of Naval Research contains the following divisions: 1) change in contract designation, 2) personnel, 3) visits and special activities, 4) research reports published since last report (five), 5) research reports to be published (three), 6) summaries of reports completed within last period (four), 7) current research projects (ten), 8) new research (two), and 9) bibliography of the last two years (eight). R 8

14, 280

Bunker, D. R. THE RELIABILITY OF SUBJECTIVE ESTIMATES OF TARGET DIFFICULTY. Proj. 7713, Task 77195, OL TM 57 21, Nov. 1957, 25pp. USAF Operator Lab., Randolph AFB, Tex.

14, 281

As one phase of an investigation into methods of determining the difficulty of radar aiming points (AP), a study was made of the reliability of subjective estimates of target difficulty. Thirty subjects rated photographs of radarscope presentations taken at four distances from the AP on radar bomb runs. Separate estimates of difficulty on a seven-point scale were obtained for each of three annotated areas on each photograph. The data were studied for reliability of estimates using analysis of variance techniques. T. R 6

14, 281

Brown, R. H. (Ed.). ILLUMINATION AND VISIBILITY OF RADAR AND SONAR DISPLAYS. Proceedings of a Symposium Sponsored by the Armed Forces-NRC Committee on Vision. Publ. 595, 1958, 210pp. National Academy of Sciences - National Research Council, Washington, D. C.

This symposium was called to determine once again what is required of radar and sonar displays and how visual needs in particular are being met by the technical developments of recent years. The 28 papers given at the symposium are divided among four major topics: operational requirements for cathode-ray tubes and displays in relation to illumination problems; methods for controlling ambient illumination; display requirements imposed by visual factors; and new techniques under development. In addition, remarks from three panel members on the presented papers are reproduced here along with a glossary of terms. T. G. I. R 28

14, 282

Kidd, J. S. & Hooper, J. J. DIVISION OF RESPONSIBILITY BETWEEN TWO CONTROLLERS AND LOAD BALANCING FLEXIBILITY IN A RADAR APPROACH CONTROL TEAM: A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 58 473, April 1959, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Aviation Psychology Lab., Ohio State University & OSU Research Foundation, Columbus, Ohio).

The general problem of optimum division of duties between two or more men who are performing essentially the same functions in a complex man-machine system were investigated. In a simulated radar approach control system, six two-man pattern-feeder control teams were evaluated under three methods of assignment (sector, rotation, and destination control) and under two levels of restraint on the option of exchanging responsibility during the approach (partial and no restraint). Measures of performance were system efficiency (mean control time,

fuel consumption, go-arounds), safety (separation error), intercontroller communication and job satisfaction (opinion inventory). T. I. R 10

14, 283

Kinkade, R. G. & Kidd, J. S. THE EFFECT OF TEAM SIZE AND INTERMEMBER COMMUNICATION ON DECISION-MAKING PERFORMANCE. Contract AF 33(616) 3612, Proj. 7184, Task 71584, WADC TR 58 474, April 1959, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Aviation Psychology Lab., Ohio State University & OSU Research Foundation, Columbus, Ohio).

The performance of single individuals and two-man teams, with and without intercommunications, was compared in a complex decision-making task. The task was an operational "game" derived from radar approach control with 48 subjects participating once in each of the three experimental conditions. Time, output, and error scores were analyzed in a study of work unit productivity and individual efficiency as affected by the conditions. The implications of the findings for increasing productivity are discussed. T. I. R 10

14, 284

Knowles, W. B. AUTOMATION AND PERSONNEL REQUIREMENTS FOR GUIDED MISSILE GROUND SUPPORT FUNCTIONS. Contract AF 41(675) 170, Proj. 7185, Task 71584, WADC TR 59 240, May 1959, 49pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (General Electric Company, Ithaca, N. Y.).

This report summarizes an investigation of the high skill level requirements found in missile systems employing automatic electronic test and checkout equipment. The study consisted of interviews; visits to factories, schools, and missile test centers; and studies of documents ranging from service records and class grades through production specifications to the latest versions of operational plans. An outline of the factors that must be considered in the design of a maintenance system is presented and discussed in detail. Further research is recommended in development of techniques for evaluating the design of test logic, maintenance operations, and manual tasks. T. I. R 23

14, 285

Kobrick, J. L. QUARTERMASTER HUMAN ENGINEERING HANDBOOK SERIES: VI. SIZE LIMITS OF THE HEAD AND NECK AREA OF THE SOLDIER WEARING QUARTERMASTER HEADGEAR. Proj. Ref. 7 83 01 005, Tech. Rep. EP 107, March 1959, 77pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

This report presents human engineering information on the size range of the head and neck area of the soldier wearing Quarter-master headgear. It should be used as a handbook by engineers and designers for establishing space allowances in the design and sizing of man-operated equipment. The data are concerned with the middle 90 per cent of the ranges of head sizes for the Army population. The information is presented in pictorial form with index scales so that dimensions can be measured on the pictures and referred to the index scale to establish actual size. I.

14, 286

Kreezer, G. L. ATTENTION VALUE OF AUDIO AND VISUAL WARNING SIGNALS. Contract AF 33(616) 135, Proj. 7184, Task 71580, April 1959, 78pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Psychology, Washington University, St. Louis, Mo.).

A summary of a series of investigations on the "attention-demand" value of auditory and visual stimuli is given. Following a survey of the literature, a method was developed which was intended to provide a laboratory analogue of real tasks and which lent itself to measurements of stimulus-effectiveness in attracting the attention of the subject. Threshold and reaction time measures could be obtained. Comparison was made of the attention-demanding values of auditory stimuli differing in frequency, and of visual stimuli differing in wavelength under different conditions of background noise. The implications for designing systems of warning signals are discussed. T. G. I. R 77

14, 287

Krendel, E. S. SHORT DURATION HARMONIC ANALYSIS OF EEG DATA. Contract AF 33(616) 5181, Proj. 7215, Task 71713, WADC TR 59 66, Feb. 1959, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (The Franklin Institute, Philadelphia, Penn.).

To assess the applicability of certain communication engineering techniques to the analysis of electroencephalographic (EEG) data, amplitude spectra were computed from .85-second samples of EEG data obtained from bi-polar electrodes positioned at the left parietal and left occipital locations. Differences were obtained between these spectra as a function of the state of consciousness of the subject. The implications of these differences for an electronic discrimination scheme are discussed. T. G. I. R 1

14, 288

Samuel, J. A. THE POSITION OF THE PIVOT IN A FOOT CONTROLLER. PE/N/ 3/55, Sept.-Oct. 1955, 28pp. The British

Iron and Steel Research Association, London, England.

To investigate the position of a foot pedal in relation to the foot, a preliminary experiment was run to de-limit the number of likely positions in which an optimum ankle position might lie. In the major experiment, seven subjects were required to move a pointer through a given distance to align it with a black pointer by operating a foot pedal in three different positions. Time taken to complete the task (a given number of runs) and the number of steps used during the runs were analyzed for differences among positions. Subjective reactions to this type of pedal and preferences for position were further analyzed. Optimum positions are given. T. G. I. R 2

14, 289

Brown, A. H. & Hodge, J. EVALUATION OF COMMERCIAL ELBOWS ADULT SIZE, ARTIFICIAL, EXTERNAL, ALTERNATING (OUTSIDE LOCKING ELBOW HINGE). Tech. Rep. 5801, Jan. 1958, 5pp. USA Prosthetic Research Lab., Walter Reed Army Medical Center, Washington, D. C.

Commercially available, adult size, external elbows (outside-locking elbow hinge) were evaluated for compliance with the requirements set forth in the Tentative Standards as approved at the Prosthetics Research Board Clinic (1956). Two Sierra adult size elbows were subjected to various functional tests (degree and quality of flexion permitted, capability of locking mechanism to provide various stable positions, ease of controlling locking mechanism, and force required to operate), physical strength tests, design and construction tests, and appearance evaluation. T. I.

14, 290

Bredon, Ruth W. RESULTS OF PROFICIENCY TESTING AT ESS: IDENTIFICATION OFFICER. Contract AF 41(657) 95, ERC Proj. 46, OAL TM 58 2, Sept. 1958, 8pp. Educational Research Corporation, Cambridge, Mass.

The aim of this series (of which this report is one) is to develop off-the-job performance tests as prototype proficiency measures for SAGE operators. The present test, the Identification Officer Test, was administered to four examinees at the Experimental SAGE Sector. (This test is briefly described). The test results are presented in detail. T.

14, 291

McFann, H. H., Hammes, J. A. & Taylor, J. E. TRAINFIRE I: EXPERIMENTAL DEVELOPMENT OF TRAINING METHODS AND PROFICIENCY TESTS FOR IMPROVING THE EFFECTIVENESS OF

COMBAT RIFLEMEN. March 1955, 158pp. USA Human Research Unit No. 3, Fort Benning, Ga.

To develop a practical basic course in rifle marksmanship instruction which will prepare the soldier to use his rifle effectively in combat and to develop proficiency tests based on combat criteria to measure the adequacy of training, comprehensive analyses of the situations confronting the rifleman in combat were made. The training course and two tests (marksmanship and target detection) were developed. Two groups of trainees were given the conventional basic training at different Army posts and a third was given the experimental course. The relative efficiency of the groups were then evaluated. Principles of effective use of the rifle are discussed. T. I. R 81

14, 292

Bradley, J. V. & Wallis, R. A. SPACING OF ON-OFF CONTROLS. II: TOGGLE SWITCHES. Contract AF 33(616) 3404, Proj. 7182, Task 71514, WADC TR 58 475, March 1959, 21pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

To investigate efficiency in the human operation of toggle switches as a function of the spacing between controls, 36 right-handed subjects performed a standardized control operation in which the center one of three closely spaced switches was operated while avoiding contact with adjacent switches. Variables were type of toggle switch, spacing, orientation of the linear array, and direction of throw; performance measures were reach-and-operation time, inadvertent touching and/or operation of adjacent switches. The data were analyzed and discussed in terms of optimal design of such controls. The findings are compared with data obtained in a previous similar experiment using push buttons. T. I. R 2

14, 293

Merck, J. W. & Ford, F. B. FEASIBILITY OF A METHOD FOR ESTIMATING SHORT-TERM AND LONG-TERM EFFECTS OF POLICY DECISIONS ON THE AIRMAN PERSONNEL SYSTEM. Proj. 7719, Task 17114, WADC TR 59 38, June 1959, 17pp. USAF Personnel Lab., Lackland AFB, Tex.

This report describes and indicates the utility of a model which simulates the flow of airmen through the Air Force personnel system under a given set of policies. This model makes it possible to estimate, with as much accuracy as is available in the input information, the effects of that set of policies at future points in time. These effects may be gauged in terms of the future distribution of grade levels, career fields, or other pertinent information that may be built into the model. T. I. R 1

14, 294

Blackwell, H. R. THE EFFECT OF TARGET SIZE AND SHAPE ON VISUAL DETECTION IV SOME RELATIONS WITH PREVIOUS INVESTIGATIONS. Proj. MICHIGAN, Rep. 2144 335 T, Feb. 1959, 21pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

This report, the fourth in a series of investigations on the effects of target size and shape on visual detection, reanalyzes data from the earlier reports to facilitate comparison with data of earlier investigators. Points of both agreement and difference are shown. An explanatory hypothesis is offered to account for the difference found for large targets of extreme shape. An investigation is reported of the adequacy of the perimeter theory in predicting the data of the present series of studies. G. R 12

14, 295

Middleton, R. H. BENDS AND DENITROGENATION IN HIGH-ALTITUDE FLIGHT OPERATIONS. Proj. 7160, Task 71812, WADC TR 58 625, March 1959, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

In order to validate the requirement for two hours of denitrogenation prior to long-range flight at high altitude, the literature on decompression sickness is reviewed and the various theories critically examined. Studies of the relative efficiency of denitrogenation in flight (by breathing undiluted oxygen) at intermediate cabin altitudes are summarized and some practical evidence accumulated incidentally from simulated flights in the low-pressure chamber is presented. T. G. R 5

14, 296

Blackwell, H. R. & Blackwell, O. M. STUDIES OF DARK ADAPTATION FOR NORMAL BINOCULAR VISION. Proj. MICHIGAN, Rep. 2144 345 T, Jan. 1959, 15pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

The dark adaptation process for observers using normal binocular vision was measured in a series of experiments. An automatic-recording dark adaptometer was used with a 0.25 degree test target of white, red, and blue light. Measurements were made following a 500-second exposure to a 1000 foot-lambert preadaptation field. The foveal retina and two peripheral locations (12 and 15 degrees) were studied. The data were analyzed for differences in the dark adaptation function due to target color and retinal location. The known spectral response curves of rod and cone cells are used to identify the receptors involved in various phases of adaptation. G. R 2

14, 297

Bell Aircraft Corporation. IM - HEP (IDEAL MAN-HELICOPTER ENGINEERING PROJECT). Bell Doc. 299 075 001, Jan. 1956, 26pp. Bell Aircraft Corporation, Fort Worth, Tex.

This brochure introduces the Ideal Man-Helicopter Engineering Project (IM-HEP), a research and development program to provide cockpit instrumentation that will allow the helicopter pilot to utilize fully the versatility of his machine. The historical background of the project, the needs, the program, the goals, and industry participation are discussed. 1.

14, 298

Balke, B. & Ware, R. W. THE PRESENT STATUS OF PHYSICAL FITNESS IN THE AIR FORCE. Rep. 59 67, May 1959, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

To collect material for the standardization of physical performance capacity, work capacity (a sensitive and realistic measure of physical fitness) was determined on more than 500 military and civilian Air Force personnel. A treadmill test was devised for screening work capacity which permitted evaluation of results in terms of physical and physiological terms: test duration in minutes, metabolic requirements for the work (based on measurements of gas exchange), cardiovascular response (pulse rate, blood pressure), oxygen consumption, and pulmonary ventilation. Factors such as age, activity, weight, and personal habits were related to the results. An arbitrary rating scale of work capacity is suggested. T. G. R 8

14, 299

Mowbray, G. H. & Rhoades, M. V. ON THE REDUCTION OF CHOICE REACTION TIMES WITH PRACTICE. Reprint Series Rep. 476, April 1959, 8pp. Applied Physics Lab., Johns Hopkins University, Silver Spring, Md.

To investigate the effect of practice upon choice reaction time, the performance of one practiced subject was recorded for two choices and four choices. The stimuli were lights positioned on a display panel in accordance with the arrangement of response buttons. Although there were ten stimulus and response positions, only the index and second finger positions were used. Each trial consisted of 3000 reaction times for the two conditions; there were 15 trials spaced over a period of five months. Mean choice reaction times for the two conditions were analyzed as a function of trials. The findings are discussed in relation to their use in information theory. T. G. I. R 14

14, 300

Muckler, F. A., Nygaard, J. E., O'Kelly, L. I. & Williams, A. C., Jr. PSYCHOLOGICAL VARIABLES IN THE DESIGN OF FLIGHT SIMULATORS FOR TRAINING. Contract AF 33(616) 2725, Proj. 7191, Task 71635, WADC TR 56 369, Jan. 1959, 132pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Aviation Psychology Lab., University of Illinois, Urbana, Ill.).

This report surveys the general problems of simulator design (primarily flight and engine systems) with reference to factors of psychological simulation that influence transfer of training. Present Air Force utilization of simulators is discussed; training research literature on flight trainers and simulators is evaluated; and a number of experimental programs are suggested. Several specific problem areas are examined with particular emphasis on possible empirical solutions. Motivational, instructional, and methodological variables are also considered. Finally, conventional theories of transfer of training are evaluated for predictive efficiency in this area. G. I. R 158

14, 301

Mebane, J. C. NEUROPSYCHIATRY FOR THE FLIGHT SURGEON. Sept. 1956, 223pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

This textbook is an outgrowth of lectures and seminars on neuropsychiatry presented at the School of Aviation Medicine, USAF. It is assumed that the student has been exposed to basic psychiatry; therefore the text emphasizes an understanding of the complex interpersonal and social problems of the Air Force environment, and their impact upon the flyer and doctor alike. Certain topics have been amplified beyond their consideration in the "Flight Surgeon's Manual": Clinical diagnoses and psychosomatic problems, Adaptability ratings for military aeronautics, Neurological problems and psychological reactions to flying stress, Mental health and administrative psychiatry. T. G. R 495

14, 302

McBlair, W., Rumbaugh, D. & Fozard, J. VENTILATION, TEMPERATURE, HUMIDITY. Contract NONR 1268(01), Nov. 1955, 87pp. San Diego State College Foundation, San Diego, Calif.

A review of available information about ventilation, temperature, and humidity effects on human performance is presented. The following are major subdivisions of this topic: temperature regulation in man, thermal changes in man under extreme thermal

14, 303

conditions, effects of extreme thermal conditions upon performance, optimal conditions (air control system requirements for comfort and efficiency, human reactions to specific atmospheric factors, and composite indices), and data for operating engineers (human factors, atmospheric conditions and regulation of air control systems). T. G. I. R 34

14, 303

Judd, D. B. (Chm.). MINUTES AND PROCEEDINGS OF THE FIRST MEETING OF THE ARMED FORCES-NRC VISION COMMITTEE, SUBCOMMITTEE ON COLOR VISION. 27 FEBRUARY 1948. Navy Department, Washington, D. C.

This report gives details of the first meeting of the Subcommittee on Color Vision. The agenda consisted of two items: (1) the problem of the admission of color deficient men in the Naval service and plans for a follow-up study throughout the term of their enlistment, and (2) the validation and field testing of the Navy Color Lantern. The discussion of these problems and accompanying recommendations are recorded.

14, 304

Lenert, R. P. ARCTIC WINTER TEST 1956-57 OF RIFLE, MULTIPLE 106MM, SELF-PROPELLED, M50. PART I. AUTOMOTIVE PHASE. OCO Proj. TB5 1401, 251 038 04, ORTB 00/6U04939, April 1957, 41pp. USA Development and Proof Services, Aberdeen Proving Ground, Md. (USA Ordnance Test Activity, Yuma Test Sta., Ariz.).

To determine the suitability and durability of the Rifle, Multiple 106 millimeter, Self-Propelled, M50 for operation under winter conditions, a production model was subjected to automotive tests during the winter season at Fort Churchill, Canada. Cold starting and warm-up of engine, functioning of personnel heater, crew comfort, mobility, and durability were studied during 1952 miles of operation on all types of terrain at temperatures to -42 degrees F. The results of these tests were summarized and used in making recommendations for design improvement. T. G. I. R 8

14, 305

Malich, C. W. & Beach, L. A. FALL-OUT PROTECTION AFFORDED BY STANDARD ENLISTED MEN'S BARRACKS. Proj. NY 340 032, NRL Prob. HO4 15, March 1957, 21pp. USN Research Lab., Washington, D. C.

This report appraises the protection against radiation offered by existing Naval installations. The method of calculating radiation shielding is described. The effectiveness of present barracks is given, as well as discussion of possible improvements

in shielding of barracks and the advisability of providing emergency basement shelter. Decontamination procedures are also discussed. Recommendations are given at the end of the report. T. G. R 15

14, 306

Parrish, J. A. A STUDY OF TWO NON-LINEAR METHODS OF COMBINING PREDICTOR TESTS. PRB Tech. Res. Note 103, May 1959, 21pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D. C.

The predictive efficiency of two relatively untried but promising methods of combining test scores were compared with that of the usual (multiple regression) method. Scores on four Army Classification Battery Tests and two experimental tests were obtained on 1000 enlisted infantrymen on their first tours of duty. The basic problem was to combine test scores by taking into account special population characteristics in such a way as to maximize prediction of rated combat efficiency. Both experimental methods used test scores for defining population characteristics: 1) interaction method made use of cross-products in prediction formula, and 2) configural method determined the best prediction for each score pattern. T. R 15

14, 307

Ribner, H. S. BOUNDARY-LAYER-INDUCED NOISE IN THE INTERIOR OF AIRCRAFT. UTLA Rep. 37, April 1956, 39pp. Institute of Aerophysics, University of Toronto, Ottawa, Canada.

At high speeds the turbulent boundary layer washing the airplane fuselage excites appreciable skin vibration, promoting strong noise in the interior. The fluctuating exciting pressure distribution can be represented as a pattern of moving waves (Fourier integral). A running ripple in the skin follows underneath each wave, and the noise is ultimately due to these ripples. The acoustical effects of the running ripples are calculated from an infinite sheet; this is the main result of this investigation. The results are used to provide a tentative estimate of the noise generated at subsonic speeds in a practical fuselage. Some comparisons are made with experiment. Finally, an idea for noise alleviation is presented. T. G. I. R 17

14, 308

Pollack, I. BINAURAL COMMUNICATION SYSTEMS: PRELIMINARY EXAMINATION. J. acoust. Soc. Amer., Jan. 1959, 31(1), 81-82. (USAF Operational Applications Lab., Bolling AFB, Washington, D. C.).

44-149

14, 315

This note reports the results of an exploratory study that examines binaural directional information in conjunction with methods of rejection filtering which have been found useful for enhancing the appreciation of spatiality and useful for enhancing multichannel listening. The approach is that of a communications system that purchases additional channels by shifting selective operations from equipments to human operators. Intelligibility test data are presented for one listener from three experimental conditions (experimental binaural, control monaural, and control binaural) and three filtering arrangements. G. I. R 3

14, 311

Silverman, A. J., Cohen, S. I., Zuidema, G. D. & Vickery, L. L. PSYCHOLOGIC AND BIOELECTRIC ASSESSMENT OF G-SUIT PROTECTION. Proj. 7215, Task 71713, WADC TN 56 400, Oct. 1958, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

Subjective evidence in the form of anecdotal reports has been presented for the protective effects of anti-g suits against fatigue. In an attempt to demonstrate this phenomenon in the laboratory, performance of a psychomotor task (dual pursuit meter) and arousal of the organism (galvanic skin response, GSR) were assessed on six subjects who were centrifuged at three g for ten rides while protected and again unprotected by an anti-g suit. Performance (average time on target) and GSR findings are compared for the two conditions. Effects of previous experience in wearing the anti-g suit are discussed. T. G. I R 5

14, 312

Rees, D. W. & Kama, W. N. SIZE OF TABS: A FACTOR IN HANDLING OF GUIDES AND CHECK-LISTS. Proj. 7184, Task 71586, WADC TR 59 158, March 1959, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

To obtain information pertaining to the design of index tabs as used on checklists to facilitate handling, an experiment was performed in which subjects were required to pick up a check list from a thighboard, turn to a specified section of the list, then replace the list back on the thighboard. The experimental variables were 1) size of tabs, 2) encumbrance conditions (bare hands and work clothes, gloves, gloves and fully inflated MC-3 partial pressure suits), and 3) tab position (top, center, or side of list). Reaction times in using tabs to locate information were studied by analysis of variance methods for effect of the variables. T. I. R 2

14, 313

Riley, J. A. OCCUPANCY THEORY WITH APPLICATION TO MULTI-CHANNEL COMMUNICATION SYSTEMS. PART 1: THEORY. Contract AF 19(604) 1396, AFCRC TN 57 562, Scientific Rep. 5, June 1957, 49pp. Parke Mathematical Laboratories, Inc., Carlisle, Mass.

This report presents a generalized occupancy theory (study of problems concerned with the distribution of a given number of objects in a given number of cells or compartments) which includes the classical and restricted theories as special cases. Some of the basic problems in the general theory are formulated and discussed. The principle tool in the development is the Markov method from the theory of random flights. From a mathematical point of view, channels in a multichannel communication system are cells occupied or not by objects of a different color representing different kinds of communications. Thus the occupancy theory can be used to determine the probabilities of various events in the use of multichannel communication systems. R 8

14, 314

Riley, J. A. OCCUPANCY THEORY WITH APPLICATION TO MULTICHANNEL COMMUNICATION SYSTEMS. PART 2: APPLICATIONS. Contract AF 19 604 1396, AFCRC TN 57 563, Scientific Rep. 6, Feb. 1958, 31pp. Parke Mathematical Laboratories, Inc., Carlisle, Mass.

This paper applies the Occupancy Theory (see 14, 313) to some problems of multichannel communication systems. Basic assumptions for a model of a communication system are stated and the resultant model is then identified with the basic model of Occupancy Theory. Since an immediate consequence of the communication model is the possibility of self-interference (two or more stations overlap in their choice of transmitting channels), the results of the theory are applied to three self-interference problems. The solutions have not only intrinsic interest, but should serve as examples for other applications. T. G.

14, 315

Riley, J. A. OCCUPANCY THEORY WITH APPLICATION TO MULTICHANNEL COMMUNICATION SYSTEMS: A CORRECTION. Contract AF19(604) 3471, AFCRC TN 59 371, Scientific Rep. 2, June 1959, 15pp. Parke Mathematical Laboratories, Inc., Carlisle, Mass.

This supplement to previous report (see 14, 313) on Occupancy Theory remedies

14, 316

an omission in the derivation of the basic result. Thus it contains revised proof of the basic theorem presented there. R 4

14, 316

Riley, M. B. & Bernardini, A. T. ANIMAL AND HUMAN STUDIES OF THE EFFECTS OF LOW-FREQUENCY OSCILLATION COMBINED WITH TRANSVERSE ACCELERATION. Proj. 7222, Task 71748, WADC TN 59 92, March 1959, 8pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This is a study of endurance to low-frequency oscillation during backward acceleration. Results are reported for animals subjected to a maximum oscillation-g pattern of 2.8 cycles per second through a 36 degree arc in a 12 g field. In addition, results are reported for human subjects subjected to a maximum oscillation-g pattern of 0.7 cycle per second through a 36 degree arc in an 8 g field. T. G. 1 R 9

14, 317

Rogillio, D. S., Jr., Beech, H. W., Gaston, E. M. & Carrier, W. M. OPERATIONAL TEST AND EVALUATION OF AIR TRAFFIC CONTROL CENTRAL AN/GSN-3 (XD-1) (VOLSCAN). Proj. 4651Y1, AFGC TR 59 21, May 1959, 126pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

This test was conducted to determine the operational capability and functional reliability of the Air Traffic Control Center AN/GSN-3(XD-1) (VOLSCAN) in an approach control environment. Emphasis was placed on VOLSCAN's effectiveness to control high-density air traffic. Two major phases in the evaluation were: 1) missions were run using targets simulating aircraft to increase proficiency of personnel and to establish procedures; 2) missions were run using real aircraft with flight profiles designed to represent typical aircraft control situations. Specific operational, equipment, and maintenance recommendations are included. T. G. 1. R 12

14, 318

Schmitz, M. A., Stark, E. A. & Willard, N., Jr. COMPARISON OF THE STEREOSCOPIC RANGE FINDER, M12 AND THE COINCIDENCE RANGE FINDER, T43 AS USED IN RANGE DETERMINATION AT NIGHT. Task FIREPOWER 1, Tech. Rep. 53, April 1959, 30pp. Human Resources Research Office, George Washington University, Washington, D. C.

A comparison was made of the performance of highly skilled range finder operators using the stereoscopic range finder, M12, and the coincidence range finder, T43, on targets likely to be encountered at night. The relationship between

target illumination and the operation of the Internal Correction Systems of the two types of range finder in reducing bias was also studied. Rangings were made on tank targets set at varying distances from the line of observation, by daylight and at night with targets under two different conditions of illumination. Recommendations are included. T. G. R 13

14, 319

Schaefer, V. H., Link, H. J., Farrar, J. U. & Wiens, D. LETHALITY IN RATS AS A FUNCTION OF FREQUENCY IN CONSTANT-DISPLACEMENT VIBRATION. USAMRL Proj. 6 95 20 001, Task 5, Rep. 390, June 1959, 14pp. Psychology Division, USA Medical Research Lab., Fort Knox, Ky.

To study the relationship between frequency of constant-displacement whole-body vibration and lethal exposure time, 186 rats were studied. Except for control subjects, all were vibrated at some one frequency until death occurred or after 12 hours. The displacement (peak-to-peak or total amplitude) was constant at .25 inches, frequencies tested ranged from 10 to 45 cycles per second and acceleration increased as the square of frequency. Lethal exposure time was analyzed as a function of frequency and acceleration. Pathological effects of vibration were determined. T. G. R 9

14, 320

Schaefer, V. H., Ulmer, R. G. & Link, H. J. SOME BEHAVIORAL AND PHYSIOLOGICAL STUDIES IN VIBRATION. USAMRL Proj. 6 95 20 001, Task, Studies of Complex Behavioral Processes, Rep. 389, June 1959, 32pp. Psychology Division, USA Medical Research Lab., Fort Knox, Ky.

To obtain information on behavioral and physiological effects of whole-body vibration four studies were made using male rats as subjects. The variables studied were body weight, food intake, fecal output, water intake, urine output, open field activity, and elevated maze and straight-alley behavior. Pathological data were also obtained. The findings are discussed in terms of vibration as a stressor, transience of vibratory effects, adaptation, and pathology. T. 1. R 23

14, 321

Scott, D. M. & Hickson, R. H. RADAR TARGET DETECTABILITY AT OUTER RANGES AS A FUNCTION OF DISPLAY SIZE USING GATED AND EXPANDED SCOPES. DRML Proj. 163, PCC Proj. D77 94 20 22, DRML Rep. 163 18, H. R. 166, Jan. 1959, 8pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

To identify radar displays which would yield superior detection thresholds at the outer ranges (from seven-tenths to maximum), four methods of displaying targets on a noise-free Plan Position Indicator were evaluated. The four displays were: 1) a 2.5 inch radius scope, gated and expanded; 2) a 3.5 inch scope, gated and expanded; 3) a five-inch scope, gated and expanded; and 4) a five-inch scope, with normal display. Five detectability thresholds were obtained from each of four subjects at each of three ranges on each display. The data were analyzed for differences among the displays.
T. G. I. R 8

14, 322

Searle, L. V., Henderson, R. L. & Markell, J. H. A PERISCOPE CAMERA INSTALLATION FOR AIRBORNE INTERCEPT RADARSCOPE PHOTOGRAPHY. NMC TR 59 3, May 1959, 16pp. USN Missile Center, Point Mugu, Calif.

A prototype periscope camera installation for airborne intercept (AI) radarscope photography now being used at the Naval Missile Center, Point Mugu, California is described. The purpose of the installation is to supplement other forms of data recording during flight tests of missile systems to aid in the study of pilot proficiency factors. The requirements for radarscope photography and associated technical problems are discussed. An improved configuration designed for operational use and programmed for early manufacture is described. I.

14, 323

Siegel, A. I. & Wolf, J. J. TECHNIQUES FOR EVALUATING OPERATOR LOADING IN MAN-MACHINE SYSTEMS. APPLICATION OF A PREVIOUSLY DERIVED MODEL TO THE LAUNCHING OF AN AIR-TO-AIR MISSILE. Contract NONR 2492(00), June 1959, 40pp. Applied Psychological Services, Wayne, Penn.

A model was derived in a previous study in order to permit an improved analysis and prediction of the effectiveness of man-machine systems. It was applied to the pilot's task of landing an F4D aircraft aboard an aircraft carrier. In the present study, the model is applied to the pilot's task of firing an air-to-air missile in a lead collision attack. The predictions from the model are presented and evaluated. They appear to conform with reality and are generally reasonable. The usefulness of the model is discussed. T. G. I. R 4

14, 324

Conrad, R. PERFORMANCE OF TELEPHONE OPERATORS RELATIVE TO TRAFFIC LEVEL. Nature, Dec. 1956,

178, 1480-1481. APU 276/56. (Applied Psychology Research Unit, MRC, Cambridge, England).

To investigate the performance of telephone operators in relation to traffic level, the traffic load per operator (cordless auto-manual exchange) was varied experimentally over a four-week period. Operator waiting time was measured by a snapreading method, and from it operator time per call was calculated. The data were analyzed to test the assumption that operator time per call is independent of traffic level. G. R 3

14, 326

Clark, W. B. M. DEVELOPMENT OF TYPE NS-2 AIRBORNE DATA RECORDER. Contract AF 33(616) 3423, Proj. 7155, Task 71804, Phase IVA, WADC TR 57 603, Feb. 1958, 26pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Testing Div., Douglas Aircraft Company, Inc., Santa Monica, Calif.).

The development of a small, direct-writing, 20 channel data recorder, designated Type NS-2, especially for airborne use, is described. Means of recording certain aircraft environmental conditions as well as physiological measurements of flight personnel are explained. The development of special transducers for measuring relative humidity and physiological temperatures is described. The influence of environmental changes on the accuracy of the recorder has been determined and is reported here. Operating, calibration, and maintenance instructions are included. T. I. R 18

14, 327

Shelanski, M. V. & Gabriel, K. L. CUTANEOUS TOXICITY EVALUATION OF AIR FORCE DEVELOPMENT MATERIALS-III. Contract AF 33(616) 5595, Proj. 7165, Task 71836, WADC TR 59 124, June 1959, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Industrial Biology Research and Testing Labs., Inc., Philadelphia, Penn.).

To establish the primary irritant and sensitization characteristics to the skin of Air Force development materials, prophetic testpatch studies were performed on laboratory animals and 300 volunteer human subjects. Three crystalline substituted phenyl ethers, three DORK flame-resistant cotton fabrics, one untreated cotton sateen fabric, and four fungicidal-treated (fluorinated diphenyl sulphide) cotton sateen fabrics were studied. Procedures for field testing are outlined. T. R 6

14, 328

Silvestro, A. W., Kelly, J. B. & Courtney, D. HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF AIRPORT TRAFFIC CONTROL QUARTERS.

(SECOND INTERIM REPORT). PRELIMINARY ENGINEERING LAYOUTS. Contract FAA/BRD 89, Proj. P., Rep. 27, June 1959, 39pp. Courtney and Company, Philadelphia, Penn.

This is the second interim report on work accomplished in giving human factors consideration to the design of airport traffic control quarters. It includes all the work of the first report plus work accomplished since its issue. Written recommendations and drawings are provided for the over-all space requirements and general layout of air traffic control quarters including the tower cab, Instrument Flight Regulations control room, controller ready room, training space, and visitors observation area. Such information is also supplied for layout of operating consoles, desks, and other furniture or furnishings for these areas. I. R 1

14, 329

Simon, C. W. BIBLIOGRAPHY OF CONTROL-DISPLAY RELATIONSHIPS. 1. DIRECTION OF MOVEMENT. Ref. 4112.40/103, 1958, 16pp. Hughes Aircraft Company, Culver City, Calif.

The references listed here represent a preliminary effort to give reports that provide human factors information on direction of movement relationship among displays and controls. The period covered is from 1943 to 1958. R 149

14, 330

Slechta, R. F., Forrest, J., Carter, W. K. & Wade, E. A. COMFORT EVALUATION OF THE C-118 PILOT SEAT (AEROTHERM). ONE OF A SERIES OF STUDIES PERTAINING TO THE DESIGN EVALUATION OF PILOT AND CREW STATION EQUIPMENT. Contract AF 33(616) 3068, Proj. 7215, Task 71724, WADC TR 58 312, March 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University, Medford, Mass.).

To evaluate certain design characteristics of the C-118 Pilot Seat (Aerotherm) in terms of their adequacy for the maintenance of human comfort, subjective and behavioral laboratory tests were administered by means of hourly questionnaires to 17 subjects during a voluntary sitting period of seven hours maximum duration. The subjects were allowed to leave the seat only when discomfort feelings compelled them to do so. On the basis of average voluntary seating time, hourly ratings of overall and of specific body regions comfort, and evaluation of individual seat parts, recommendations for seat design improvement were made. T. G. I. R 1

14, 331

Coleman, K. G. TARGET COLOUR-ATION. AMC Exp. Proj. 55/6 78, Rep. 3041, Oct. 1958, 13pp. RCAF Air Armament Evaluation Detachment, CEPE, Cold Lake, Alberta, Canada.

To select the best possible color, or color combination for visual and photographic computation, ten color samples were prepared and compared visually, by means of black and white photography, and by means of color photography. A series of tests were made of the colors applied to ground targets under varied lighting conditions. From the results obtained the most obvious color combination was selected and applied to an MB-3 Swept Wing Target. This target was towed and photographed under varied lighting conditions. The results were assessed and compared to visual observations. Recommendations for an optimum color scheme are included. T. I.

14, 332

Sprague, M. E. & Ross, C. W. WORLD GUIDE TO FIELD CLOTHING REQUIREMENTS. Proj. Ref. 7 83 01 005, Tech. Rep. EP 115, July 1959, 40pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

A rapid method for determining the type and amount of clothing required for seasonal wear in a given world area is presented in this guide. The world has been classified into nine types of field clothing requirement areas. It has been determined that four distinct ensembles are required to protect troops adequately against all types of natural environments encountered in these nine areas. Maps and tables are presented to 1) indicate the general amount of clothing required in all areas, 2) prescribe the assortment of field clothing in each place and in each season, and 3) designate camouflage requirements for the issue of hot weather assortments and over whites. T. I. R 57

14, 333

Sperling, H. G. & Lee, G. B. THE AREA-INTENSITY RELATIONSHIP AT THRESHOLD FOR THREE STIMULUS DURATIONS IN THE HUMAN FOVEA. Proj. NM 22 01 20, Subtask 1, Rep. 1, USNMRL Rep. 287, May 1957, 6pp. USN Medical Research Lab., Submarine Base, New London, Conn.

The relationship of area and intensity functions for three stimulus durations (0.001, 0.040, 0.250 seconds) in the human fovea were re-determined and are reported in this paper. Seven circular stimuli were used ranging in visual subtense from about

one minute to one degree in diameter. Threshold data from two subjects (right eye monocular observation) obtained by the serial method of limits are reported for each stimulus area and each stimulus duration. The mathematical relationship describing the function was determined and discussed in relation to previous findings. T. G. I. R 13

14, 334

Conrad, R. & Hille, Barbara A. TELEPHONE OPERATORS' ADAPTATION TO TRAFFIC VARIATIONS. J. Inst. elect. Engrs., Jan. 1958, 4(New Series), 10-14. APU 282/58. (Applied Psychology Research Unit, MRC, Cambridge, England).

To test the assumption that the rate at which telephone calls enter an exchange does not affect the time taken by operators to deal with them, experiments were carried out at an auto-manual cordless telephone exchange over a period of four weeks. The main experimental variable (rate of work in terms of calls per operator per hour) was controlled by varying the number of operators on duty. A snap-reading method was used to measure the proportion of total time spent operating. The data were analyzed in terms of effect of traffic level on operator performance. T. G. R 8

14, 336

Tillman, T. W. & Jerger, J. F. SOME FACTORS AFFECTING THE SPONDEE THRESHOLD IN NORMAL-HEARING SUBJECTS. Rep. 59 69, May 1959, 5pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Audiology Lab., Northwestern University, Evanston, Ill.).

To investigate the effects of 1) knowledge of test vocabulary and 2) practice in responding to words at threshold intensity, three groups of ten normal hearing subjects each were formed. Two spondee thresholds were obtained for each subject (List E of Auditory Test W-1) with exactly 18 spondee words. In group 1, the initial threshold was obtained with words one through 18, the second with words 19 through 36. In the other two groups both thresholds were obtained with the first 18 words; in the third group, however, the words were first read aloud to each subject. The data from the three groups were compared for effects of the two variables. T. R 3

14, 337

Westheimer, G. ACCOMMODATION LEVELS DURING NEAR CROSSED-CYLINDER TEST. Contract NONR 495(09), RF Proj. 654, Tech. Rep. 4, May 1959, 3pp. Ohio State University Research Foundation, Columbus, Ohio. (Reprinted from: Amer. J. Optom., Nov. 1958, Mono. 242, 1-6).

To investigate the validity of the crossed-cylinder test as a measure of near

accommodation level, eight young subjects were tested. Accommodation levels were measured in each subject when presented with a visual configuration consisting of a set of three horizontal lines at one optical distance and a set of three vertical lines at a different optical distance. Responses to each set of lines separately and together were analyzed. A modification of the test is suggested. I. R 2

14, 338

Vickers, T. K. & Miller, R. S. SIMULATION STUDIES OF AIR TRAFFIC CONTROL PROBLEMS IN HIGH DENSITY AREAS. ca. 1958, 7pp. CAA Technical Development Center, Indianapolis, Ind.

The CAA Technical Development Center (TDC) has used the dynamic air traffic control simulator as a tool in the study of various high-density areas such as Los Angeles and New York to improve the route structure in the en route and terminal areas and to study the effects of new airports and revised runway configurations. This paper describes the principal steps taken in such simulation studies including the preparations, the simulation itself, and the analysis of results. I. R 1

14, 339

United States Steel Corporation. MAINTENANCE APPRENTICESHIP PROGRAM. Business Administration and Economics Volume VI, Number 27, April 1959, 2pp. Public Relations Dept., United States Steel Corporation, New York, N. Y.

This paper describes briefly an apprentice training program at the Pittsburgh, California Works, Columbia-Geneva Steel Division, United States Steel Corporation. The program is aimed toward the development of capable personnel for the various trades required for maintenance and operation of facilities throughout the Works. I.

14, 340

USN Research Lab. COMPARATIVE EVALUATION OF THREE APPROACHES TO HELICOPTER INSTRUMENTATION FOR HOVERING FLIGHT. Proj. NA 550 010, NRL Prob. Y02 11 & BuAer Prob. TED NRL AE 7047, May 1957, 31pp. USN Research Lab., Washington, D. C.

To compare three helicopter flight display systems (conventional, integrated, and quickened), a simulator was constructed consisting of cockpit system and pilot seating arrangement with an analog computer for solving the dynamics of motion. The operator's task was to minimize translational motion while the vehicle was subject to gust disturbances; in some conditions a secondary task (controlling heading) was added. Each of six subjects accumulated approximately 25 hours of simulator time. The

error scores were analyzed for differences among the systems and for the effect of the stress of a secondary task on these differences. 1. R 4

14, 341

Peters, G. A. & Seminara, J. L. ACADEMIC TRAINING NEEDS IN HUMAN FACTORS ENGINEERING. J. engng. Educ., May 1959, 49(9), 799-805. (University of Southern California, Los Angeles, Calif. & Dover, N. J.).

This is a discussion of the academic training needs in the field of human factors engineering and represents an initial effort to clarify some of the major problems and offer some proposals for their solution. The problem areas were identified by modified job analyses with non-supervisory personnel in the field followed by interviews with various levels of supervisory personnel to determine what they considered current training deficiencies to be. A suggested core curriculum is presented to illustrate how a one-year graduate level program could be organized to cover the range of problems of greatest importance. T. R 10

14, 342

US Department of Agriculture Library. BIBLIOGRAPHY OF AGRICULTURE. ITEMS 63837-70688, Aug. 1959, 23(8), 209pp. US Department of Agriculture Library, Washington, D. C.

This is an index to the literature of agriculture and related sciences received in the Library of the United States Department of Agriculture. Scientific and technical publications are as complete as possible, but only selected popular publications are indexed. Publications in the languages of Western Europe and Russia (or summaries, titles or abstracts in that language) are included. Subjects included are plant science, soils and fertilizers, forestry, animal industry, entomology, agricultural engineering, agricultural products (processing, distribution, statistics), agricultural economics, and food and nutrition. An author index is provided. R 6900 (approx.)

14, 344

Speckels, M. L. BIBLIOGRAPHY ON SHOCK ABSORPTION STUDIES. FOURTH REVISION. March 1957, 73pp. USN Ordnance Test Station, China Lake, Calif.

This report contains abstracts of 28 studies on the properties of cushioning materials for the design of cushions for packaging. Data are included for six groups of materials into which a total of 45 materials are divided: 1) cellulose, 2) felt, cotton, and wool, 3) wood fiber, 4) shredded paper and the corrugated fiberboards, 5) rubber, rubberized fiber and hair, 6) glass fiber. Tables describing all of the materials tested, their properties, and their design curves,

where uniform, are included. An example of the use of the curves is given to illustrate their use. T. G. R 37

14, 345

Torrey, Jane W. EVALUATION OF COLOR VISION TESTS. SUPPLEMENTARY TECHNICAL REPORT. Contract NONR 996(03), June 1959, 7pp. Connecticut College, New London, Conn.

To test the hypothesis that blue-yellow discrimination requires a longer exposure period than red-green to achieve its minimum threshold, a pilot study was performed measuring the discrimination thresholds between points near a neutral center of the ICI Chromaticity Diagram along the two dimensions, red-green and blue-yellow. Each stimulus consisted of a pair of colors to be judged as to the position of the blue or green and was exposed for two different intervals: 1/5 and two seconds. Six observers were used. Thresholds of discrimination and ratios of blue-yellow to red-green thresholds for both exposure times were calculated from the data as a test of the hypothesis. T. G. 1. R 9

14, 346

Tolhurst, G. C. THE EFFECTS OF SIGNAL-TO-NOISE RATIOS AND PEAK CLIPPING UPON A TIME ACCELERATED MULTIPLE-CHOICE INTELLIGIBILITY TEST. Joint Proj. NM 18 02 99, Subtask 1, Rep. 83, Jan. 1959, 15pp. USN School of Aviation Medicine, Naval Air Station, Fla.

In an attempt to construct an intelligibility test that could be used as a sufficiently sensitive measure for indicating subtle differences among stressor situations, a multiple-choice test in which one-half of the test items had a progressively accelerated presentation was constructed. This test was compared with a comparable test of regularly spaced items, and with the test as recorded by one or by three speakers. Various signal-to-noise ratios (from +4 to +16 decibels) and levels of peak clipping (from 0 to 30 decibels) were also tested. Mean percent reception scores were analyzed for the effect of these various conditions. T. G. R 6

14, 347

Tonnendorf, J. BEATS IN COCHLEAR MODELS. J. acoust. Soc. Amer., May 1959, 31(5), 608-619. (University Hospitals, Iowa City, Iowa).

This paper describes the hydrodynamic phenomena observed in cochlear models when responding to beat signals. The effect of beats of imperfect unisons and of mistuned consonances upon the cochlear fluid motion and upon the traveling wave pattern were observed. Both continuous and stroboscopic illumination were used for observation and high-speed motion pictures were used for

IV-105

observing the displacement pattern of the membrane. These observations give evidence as to the mode of frequency analyses performed by the model in the case of complex stimulation. G. I. R 18

14, 348

Talman, W. G. SAFETY IN MINING. 1958, 2pp. Public Relations Department, United States Steel Corporation, New York, N. Y. (Reprinted from: Mining and Geology, Feb. 1959, VI(30), 2pp.).

The injury experiences in mining (coal, metal and non-metal) for the years 1954 to 1957 and for the first ten months of 1958 are presented in tabular form. The safety accomplishments of 1958 are reviewed: cementation of stratified roof rock, hydraulically-moved canopy for use in loading machines, experiments to minimize mountain bumps, improvement in ventilation and dust control, use of A-C power for equipment, and education and job-training of employees. T. I.

14, 349

USAF Air Technical Intelligence Center. SELECTED ARTICLES BY VARIOUS AUTHORS FROM SOVETSKAYA AVIATSIYA (SOVIET AVIATION). 26 JUNE THRU 3 JULY 1957. F TS 9299/III, July 1957, 53pp. USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio.

This report contains selected articles that have been translated into English from Soviet Aviation. Titles included are: 1) Over long distance flight routes (Nikitin and Chkalov), 2) On the way toward an atomic aircraft (Pokrovskiy), 3) The nearest future of aviation automatics (Krasovskiy), 4) Engines without fuel (Kaganovich), 5) Five times faster than sound (Pyshnov), 6) Jet aircraft will not become tired (Serenson), 7) The aircraft "Ukraine" in Moscow, 8) The international geophysics year (Bardin), 9) Problems of science and technique: a laboratory beyond the reaches of the earth (Karpenko), 10) Yesterday at Vnukovo airfields, and 11) Among aircraft designers (Krestovskiy). R 11

14, 350

Peters, G. A. & Adams, B. B. FROM HUMAN-FACTORS STUDIES. THESE 3 CRITERIA FOR READABLE PANEL MARKINGS. Prod. Engng., May 1959, 30(21), 55-57.

This paper provides some guides for readable panel markings such as labels, counters, legends, and identifying tags. Suggestions are made for selecting the best lettering for visibility, information content for rapid scanning, and best placement for lettering. T. I.

14, 351

Courtney, D., Colman, K. W., Silvestro, A. W. & Kelly, J. B. HUMAN FACTORS

CONSIDERATIONS IN THE DESIGN OF AIRPORT TRAFFIC CONTROL QUARTERS. INTERIM REPORT. Contract FAA/BRD 89, Proj. P. Rep. 26, April 1959, 46pp. Courtney and Company, Philadelphia, Penn.

This report is the first of a series of human factor studies that are concerned with the design of air traffic control quarters. The nature of a human factors group and the problem of this study as perceived in human factors terms are discussed. A second and third section are devoted primarily to the tower cab, an analysis of the problems of information processing and living quarters, and a series of specific recommendations resulting from the analysis. I. R 12

14, 352

Dardano, J. F. & Mower, I. RELATIONSHIPS OF INTERMITTENT NOISE, INTER-SIGNAL INTERVAL AND SKIN CONDUCTANCE TO VIGILANCE BEHAVIOR. Proj. TBI 1000, Tech. Memo, 7 59, July 1959, 29pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

To investigate the relationships of intermittent, low intensity, ambient, white noise, inter-signal interval variability and basal skin conductance to prolonged observation, 36 observers, separately, monitored a cathode ray tube screen for a continuous three-hour period in an isolated environment. The task was to differentiate a total of 180 critical signals that differed from a periodically blinking background signal only by a larger amplitude. Performance was measured by reaction time. Skin resistance was at 15-second intervals throughout the session. Performance data were analyzed for effects of the experimental variables. G. R 11

14, 353

Nadel, A. B. RADIOBIOLOGICAL PROBLEMS OF MANNED SPACE FLIGHT. Rep. RM 59TMP 38, July 1959, 12pp. Technical Military Planning Operation, General Electric Company, Santa Barbara, Calif.

An analysis of the problems of manned space flight produced by the existence of cosmic ray particles is presented. Recent findings based on the satellite explorations and lunar probes are analyzed and segments in space available to space flight by unprotected man are indicated. The biologic effects and exposure tolerance limits of primary and secondary cosmic radiation are discussed. Some possible protective measures are indicated and problems needing investigation are listed. T. R 16

14, 354

O'Connell, M. H. & Baccaro, P. M. MEASUREMENT OF AUDITORY THRESHOLD BY MANUAL AND SAM AUTOMATIC AUDIOMETRY. Rep. 58 131, March 1959,

10pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

To test the reliability of the test programming (a modified descent) technique used by the SAM automatic audiometer, threshold values obtained by this audiometer were compared with the results of two types of descending stimulus manual audiometry (single and triple descent). Two groups of unskilled listeners were tested: 24 with normal hearing and 24 with subnormal hearing. Each subject received two tests by each method separately for each ear at six frequencies: 500, 1000, 2000, 3000, 4000 and 6000 cycles. Threshold values were analyzed for comparability among methods and for test-retest reliability of each method. T. R 10

14,355

Parry, J. B. Fokkema, S. D., Bray, C. W., Benoit, J., et al. AVIATION PSYCHOLOGY IN WESTERN-EUROPE AND A REPORT ON STUDIES OF PILOT PROFICIENCY MEASUREMENT. Publ. 1, 1958, 64pp. Swets & Zeitlinger, Amsterdam, Holland.

This book presents 12 papers on aviation psychology in various countries of Western Europe: England, Belgium, Germany, France, Norway, Switzerland, Denmark, Sweden, and the Netherlands. The introductory paper is on the pilot proficiency measurement in the United States. The papers all give the areas of aviation psychology covered, the methods employed, and the validity of these methods with special reference to the nature of the criteria used. The major area dealt with in these papers is pilot proficiency measurement. T.

14,356

Evrard, E. RESCUE OF AVIATORS BY MEANS OF EJECTION SEATS. ATIC 305111 A, F TS 9115/III, 1956, 16pp. USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio. (Belgian Air Force Medical Service, Belgium).

This report reviews 15 cases wherein ejection seats were used in the pursuit plane squadron of the Belgian Air Force during a period of five years (1952-1956). The circumstances surrounding the ejection where the consequences were fatal and those where the conditions under which the ejection took place were abnormal are described. Technical comments and practical suggestions resulting from the analysis of ejections are made under six points: 1) jettisoning the glass enclosure of the cabin, 2) position of feet before ejection, 3) minimum altitude for safe ejection, 4) the jump from high altitude, 5) the equipment of flight carried during ejection, and 6) aeromedical instruction of air personnel. R 3

14,357

Fine, B. J. & Gaydos, H. F. THE RELATIONSHIP BETWEEN INDIVIDUAL PERSONALITY VARIABLES AND BODY TEMPERATURE RESPONSE PATTERNS IN THE COLD. Proj. 7 83 01 005, Tech. Rep. EP 106, March 1959, 11pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

To study relationships between certain psychological and physiological responses to stress (cold exposure), 57 male volunteer test subjects were studied. Each completed the Minnesota Multiphase Personality Inventory, were measured for weight, height, and body fat, and were then exposed nude to successive climatic conditions of 1) 70 degrees F. (Fahrenheit), 50 per cent R.H. (relative humidity), no wind; 2) 50 degrees F., 50 per cent R.H., five miles per hour wind; and 3) 78 degrees F., 50 per cent R.H., no wind; for periods of 30, 75, and 115 minutes respectively. Skin and rectal temperatures were recorded during all periods; subjective response regarding feelings of warmth were obtained during cold exposure. Analysis was made of relationships between personality variables and body response patterns. T. R 17

14,358

Fried, C. & Ivey, Lois F. A HUMAN ENGINEERING EVALUATION OF SPOTTING ROUNDS WITH RESPECT TO FIRE DIRECTION CAPABILITIES. Proj. TBI 1000, Tech. Memo. 4 59, June 1959, 31pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

To evaluate spotting rounds with respect to fire direction capabilities, 12 enlisted men of the 82nd Airborne Division, Fort Bragg, North Carolina, made observations of spotting rounds randomly placed around the target. Four distances were used: 500, 1000, 1500, and 2000 yards. The subjects used standard Army M16 field type binoculars (7X magnification) and were required to make corrections in yards for azimuth and range from the position where the spotting round appeared to actual target position. The radial and range errors were analyzed as a function of distance. The feasibility of the technique for military use is discussed. T. G. I.

14,359

Woodham, R. M. INSTRUMENT PANEL WARNING LIGHTS. Human Factors Bulletin 58 4H, ca. 1958, 1p. Flight Safety Foundation Inc., Los Angeles, Calif. (Cornell-Guggenheim Aviation Safety Center, Ithaca, N. Y.).

This is a brief note concerning instrument panel warning lights. Several features of the illuminated legend panel warning lights

used in the Lockheed Electra and Jet Star which are of interest from a human factors angle are enumerated. I.

14,360

Fletcher, J. L. & Riopelle, A. J. THE PROTECTIVE EFFECT OF THE ACOUSTIC REFLEX FOR IMPULSIVE NOISES. Proj. 6 95 20 001, Task USAMRL T I, MEDEA, Rep. 396, Sept. 1959, 11pp. USA Medical Research Lab., Fort Knox, Ky.

To determine the effect of acoustic reflex (AR) action upon temporary threshold shifts following exposure to repeated impulse noise, 24 human subjects were exposed to 100 rounds of machine gun fire (fired one round at a time) under two conditions: with the AR activated, with AR inactive. Temporary threshold shifts resulting from the two conditions were compared and discussed in terms of the protective value provided by the acoustic reflex. T. G. I. R 12

14,361

Fletcher, J. L. COMPARISON OF ATTENUATION CHARACTERISTICS OF THE ACOUSTIC REFLEX AND THE V-51R EAR-PLUG. Proj. 6 95 20 001, Task USAMRL T I, MEDEA, Rep. 397, Sept. 1959, 8pp. USA Medical Research Lab., Fort Knox, Ky.

To compare the attenuation characteristics of the acoustic reflex (AR) and the V-51R ear plug, pre- and post-exposure thresholds were obtained for 13 subjects exposed under two conditions to 100 rounds of machine gun fire (fired one round at a time). In condition I the AR was activated to protect the listener and in condition II the V-51R ear plug was used. Temporary threshold shifts were compared for the two conditions and the practical implications for noise protection discussed. T. G. I. R 4

14,362

Graham, A. J. SOUNDPROOFING MATERIALS AND THE INSTALLATION THEREOF IN AIRCRAFT. Contract AF 33(616) 2379, Proj. 1370, WADC TR 55 97, March 1955, 46pp. USAF Aircraft Lab., Wright-Patterson AFB, Ohio. (Frank Mayer Engineering Company, Los Angeles, Calif.).

To evaluate current materials and methods used in installation of soundproofing in military aircraft and to develop more suitable methods if possible, surveys of design, fabrication and installation were made of aircraft produced by six West Coast airframe manufacturers. Service and maintenance data were obtained from four United States Air Force bases. An approved evaluation procedure was used to determine characteristics desirable for inclusion in optimum blanket development. Optimum blankets were designed, fabricated, installed, and evaluated on a test panel simulating an aircraft fuselage. Recommendations are included together with procedures for installation. T. I. R 11

14,363

Hopkins, R. E., Eyer, J. A., Miller, Norma & Fleischman, A. A. INVESTIGATION OF METHOD FOR EVALUATING QUALITY OF IMAGES FORMED BY PHOTOGRAPHIC OBJECTIVES. FIRST QUARTERLY PROGRESS REPORT. Contract DA36 039 SC 63097, Aug. 1954, 30pp. Institute of Optics, University of Rochester, Rochester, N. Y.

This is the first progress report on a research contract investigating methods for evaluating quality of images by photographic objectives. Previous research by this same laboratory is reviewed and the lines of the present investigation are based on the review. A summary of the first quarter work includes 1) an investigation of the relationship between resolving power and wavelength on a number of different films, and 2) lens testing. Plans for future work are given. G. I. R 1

14,364

Hicks, S. A. THE MOTIVATIONAL EFFECTS OF REST PERIODS ON PERFORMANCE. OCO Proj. TBI 1000, Tech. Memo. 8 59, Aug. 1959, 18pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

To investigate the effects of different rest schedules on the performance of a heavy rotary task, 40 subjects were tested under two schedules: 1) fixed interval--rest after a given amount of time, and 2) fixed ratio--rest after a given number of responses. Rate of response (total number) and work output (in foot-pounds) were analyzed for differential effects of the rest schedules. T. G.

14,365

Hansen, O. K., Franks, P. E. & Modrick, J. A. NATURE AND USE OF THE MAC-2 (MALFUNCTION AND CIRCUITRY) TRAINER. Proj. 1710 71606, WADC TN 59 140, May 1959, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report discusses the MAC-2 trainer, which simulates the data flow of the MA-7A bomb-nav system, and can be used for training and proficiency measurements in the use of data flow information and technical manuals by flight-line mechanics. A brief history, advantages and limitations, suggested modifications, research problems, and empirical basis for uses of the trainer are included. I. R 10

14,366

Hosken, Bobbie. ENGINEERING PSYCHOLOGY BRANCH BIBLIOGRAPHY. Aug. 1959, 20pp. USN Research Lab., Washington, D. C.

This bibliography is a revision to date of the bibliography compiled by Daniel Fallon, July 1957. All unclassified reports issued by the Engineering Psychology Branch

14, 367

between its founding on October 1, 1945 and the present are listed in chronological order. An author index is included. R 134

14, 367

Jackson, K. F. THE MULTIPLE TRACKING TEST. FPRC 1072, Nov. 1958, 27pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

The first part of this report deals with a description of the equipment and the methods of performance measurement of the Multiple Tracking Test. This test contains five separate control systems in each of which a pointer, subject to disturbances, can be controlled by turning a knob. The number of control systems in use and type of deviations may be varied at will. Over-all performance accuracy as well as some aspects of the skills involved can be measured. The second part of the report describes some experiments in which the test has been used: effect of hot environments and the effect of task characteristics, such as number of control systems and velocity of pointer disturbance. T. G. I. R 20

14, 368

Jackson, K. F. PERFORMANCE IN A SIMULATED HIGH-ALTITUDE EMERGENCY. FPRC 1058, Dec. 1958, 7pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

To assess the chances of pilots, using pressure breathing equipment, to make a successful descent to safe altitudes, a high-altitude emergency situation was simulated in a decompression chamber. Performance was measured by a multiple tracking test which the subject worked at before, during, and after the emergency. The subjects had been trained in using the pressure breathing equipment which each wore throughout the work period. Error scores and number of control movements were analyzed for effects of the "emergency." G. I. R 6

14, 369

Kidd, J. S. RESEARCH ON HUMAN ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL. Contract AF 33(616) 3612, Proj. 7184, R. F. Proj. 690, April 1959, 38pp. Ohio State University Research Foundation, Columbus, Ohio.

This final report of a long term research study of air traffic control in its human engineering aspects consists of brief summaries of 47 studies. These reports consist of major system studies which employed the Electronic Air Traffic Control Simulator (designed and developed for the project) and technical support studies involving many research tools and equipment. A developmental trend from factors directly related to system equipments to procedural

and organizational characteristics of the system appears in the major studies. The technical reports range from investigations of team work to work on lighting systems for radar centers with emphasis on ability of human operators to perceive and interpret input signals from their environment. R 60

14, 370

Wattles, G. B., Weiss, E. C. & Holzen, D. E. AN EVALUATION OF MODE SELECTOR SWITCH ARRANGEMENTS. OCO Proj. TB1 1000, Tech. Memo. 10 59, Aug. 1959, 21pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

A study was initiated to determine the optimum switching arrangement in terms of operator performance for the selection of the track, acquisition and search modes for a proposed Anti-Aircraft (AA) weapon system. Five switching arrangements were studied. One hundred subjects were trained in the task to error-free performance, then tested under a time stressor (stimulus presentation rate increase) until a breakdown point was reached when he could no longer respond. Errors of commission and of omission, breakdown rate, control handle movement, and subjective statements of preference were analyzed in terms of the different switching arrangements. T. G. I.

14, 371

Walraven, P. L. & Leebeck, H. J. RECOGNITION OF COLOR CODE BY NORMALS AND COLOR DEFECTIVES AT SEVERAL ILLUMINATION LEVELS. AN EVALUATION STUDY OF THE H. R. R. - PLATES. Rep. 1ZF 1959 9, June 1959, 18pp. Institute for Perception RVO-TNO, Soesterberg, Netherlands.

To establish the relationship between the ability of normals and color defectives to recognize the color code of resistors and their quantitative classification according to two tests of color deficiency (Hardy-Rand-Ritter and Ishihara plates), 69 resistors each with colored bands were presented to each of 81 subjects who identified the colors, using a list of possible names. The total number and kind of mistakes were compared with quantitative classification of each subject by the two tests. All tests were conducted with illuminant C, 500 lux. Further study of 40 subjects was conducted at lower illumination levels. T. G. I. R 4

14, 372

Zarriello, J. J. IDIOPATHIC ORTHOSTATIC HYPOTENSION AND ITS RELATIONSHIP TO POSITIVE G TOLERANCE. Res. Proj. NM 11 01 11, Subtask 1, Rep. 13, May 1959, 10pp. USN School of Aviation Medicine, Naval Air Station, Fla.

This paper presents two cases that demonstrate decreased positive g tolerance as a consequence of orthostatic hypertension. Two student pilots, normal in all respects but demonstrating a definite fall in blood pressure on assuming the upright position, were subjected to human centrifugation. Their respective greyout, blackout, and unconscious threshold levels were determined and compared to 115 normal cases subjected to centrifugation in the same manner. The implications for diagnostic study as well as for the screening of naval air cadets are discussed. T. R 12

14, 373

Zarriello, J. J. & Norsworthy, M. E. THE CORRELATION OF SCOTOPIC AND PHOTOPIC VISION IN RELATIONSHIP TO BLACKOUT TOLERANCE ON THE HUMAN CENTRIFUGE. Res. Proj. NM 11 02 11. Subtask 1, Rep. 2, April 1959, 7pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To compare the blackout thresholds obtained under scotopic and photopic levels of intensity on the human centrifuge, 20 subjects were tested. Each subject was dark adapted, the blackout threshold determined (light intensity 0.625 log units above absolute visual threshold) while being centrifuged in a relaxed unprotected state; a second threshold measurement was made wearing an anti-blackout suit. Following ten minutes in full light the procedure was repeated using a target with a light intensity of 3.9 millilamberts. The data were analyzed for relationships between blackout thresholds for the two light conditions, protected and unprotected. T. R 2

14, 375

Von Beckh, H. J. FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY THE WEIGHTLESS STATE. Proj. 7851, AFMDC TN 58 15, Dec. 1958, 45pp. USAF Missile Development Center, Holloman AFB, N. M.

Pre-weightlessness and post-weightlessness accelerations were simulated in jet aircraft. Records were made of accelerations, both of the aircraft and those experienced by the subject; heart action (EKG); galvanic skin resistance (GSR); subject's behavior (cinematographic); and subjective impressions of subject (voice recording). Records from 11 subjects were analyzed for effect of the experimental conditions on acceleration tolerance and efficiency of physiological recovery mechanisms. The implications for manned space flight are discussed. G. 1. R 22

14, 376

White, C. T. & Gilliland, D. C. LETTER REPORT OF PROJECT NR CE 2056, "EVALUATION OF TELESPECTACLES" (DA PROJ UNKNOWN; RDB TECH OBJ UNKNOWN). Proj. NR CE 2056, ATBF CE 2056, May 1957, 18pp. USA Airborne and Electronics Board, Fort Bragg, N. C.

To evaluate telespectacles for use by the individual soldier to determine if they 1) improve his capability for collection of intelligence information in a combat surveillance role and 2) increase his night driving capability under low illumination levels, various tests were performed. The physical characteristics were determined and tested for ruggedness and ease of adjustment and handling under field conditions. The test items were used under conditions of natural night illumination for reconnaissance; as an aid for reading maps, aerial photos, dials, meters, and making notes and sketches; and for night driving. Recommendations are included. T. I. R 1

14, 377

Stokes, A. W. & Hughes, W. P. PHYSIOLOGICAL TRIALS OF HIGH BOOTS (P. V. C. UPPERS) AND ANKLE BOOTS (I. G. S.) WITH ANKLETS AND PUTTEES. (INCLUDING A COMPARISON BETWEEN JUNGLE BOOTS AND HIGH BOOTS WITH TERYLENE UPPERS). Rep. 82, Nov. 1957, 21pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

To compare some physiological aspects of five types of army boots (High Boots, Ankle Boots with web anklets, Ankle Boots with puttees, High Boots with Terylene uppers and Jungle Boots), experiments were designed to assess these footwear by the following criteria: thermal insulation as evidenced by foot and lower leg temperatures, water repellancy as indicated by measured water uptake, and sweat retention by weighing the sweat content of socks and boots. Trials were carried out in two phases: 1) dry shod to obtain foot temperatures and sweat retention after marching, and 2) wet shod to provide information on water repellancy. T. I. R 21

14, 379

Burrows, A. A. & Cameron, C. THE COMPARISON OF ATTITUDE INDICATORS USING LIMITED FLIGHT SIMULATION. FPRC 978, Dec. 1957, 41pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England & Royal Aircraft Establishment of the Ministry of Supply, London, England).

To evaluate the relative merits of several attitude indicators, limited though complex flight simulation was used. The experiment was further designed to yield data for developing future display evaluation techniques. Trained pilots, as subjects, were required to "fly" the simulated aircraft from a selection of suddenly displayed attitudes to "straight and level." The performance of this task (time to first response, errors in initial movement direction, control errors, time to complete response) was recorded and analyzed. The results give some useful indications of both the dynamic characteristics of the displays and of the potentialities of the technique. T. G. I. R 11

14, 380

Domey, R. G., McFarland, R. A. & Chadwick, E. THRESHOLD AND RATE OF DARK ADAPTATION AS FUNCTIONS OF AGE AND TIME: A DERIVATION. ca. 1955, 20pp. Harvard School of Public Health, Boston, Mass.

To present a mathematical derivation of a model for representing dark adaptation as a function of age and time, 30 subjects, drawn from each of eight decades ranging from the teen-age level through 89, were studied. Following pre-exposure (three minutes) of the right eye to a standard 1500 millilambert incandescent light source, a test flash was first presented within 59 seconds and readings were taken at stated intervals over a period of 40 minutes. The data on rate of adaptation were analyzed as a function of age and a mathematical model describing the form was derived. T. G. R 2

14, 381

Shultz, G. L. THE USE OF THE IBM 704 IN THE SIMULATION OF SPEECH RECOGNITION SYSTEMS. FINAL REPORT. 1 JULY 1956 TO 31 DECEMBER 1957. Contract NONR 2101 (00), NR 048 108, Res. Rep. RC 37, Jan. 1958, 20pp. Research Center, International Business Machines Corporation, Yorktown Heights, N. Y.

The first step in mechanical speech recognition involves the analysis of a large number of speech sounds to determine the characteristics by which these sounds may best be discriminated. To accomplish this analysis special advantage is taken of techniques made possible by the advent of the large scale digital computer. This paper describes the equipment required to both facilitate editing samples of sounds for analysis and convert these sounds to digital form suitable as computer inputs. A system of programs is presented and the feasibility of the computer as a research tool is illustrated. G. I.

14, 382

Savage, I. R. SURVEY OF NON-PARAMETRIC STATISTICS. Contract NONR 2582(00), Task NR 042 200, Special Rep. 1, Nov. 1958, 8pp. School of Business Administration, University of Minnesota, Minneapolis, Minn.

This paper is concerned with a discussion of the range of applicability and modes of inference of nonparametric statistics. Limitations of these statistics are commented upon and alternative modes of inference are suggested as follows: nonparametric point estimation, nonparametric confidence intervals, hypothesis testing and decision making, and nonparametric tolerance intervals. G. R 23

14, 384

Ernsting, J. THE TISSUE PRESSURES OF THE EXTREMITIES DURING HIGH PRESSURE BREATHING. FPRC 927, July 1955, 13pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

To investigate the tissue pressures of the extremities during high pressure breathing, the pressure required to introduce small (1.65 cubic millimeters) quantities of fluid through a needle into the tissue under observation was determined for a subject breathing normally and again during high pressure breathing with trunk counterbalance. The subcutaneous of the forearm and thigh, the brachioradialis and triceps muscles of the upper limb and the vastus lateralis, gastrocnemius, soleus and anterior tibial muscles of the lower limb were investigated. The data were analyzed to assess the changes in vascular transmural pressures in these areas which occur with pressure breathing. Effects of digital compression and inflation of anti-g suit were studied. T. G. R 6

14, 386

Harcum, E. R. & Rabe, A. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD: VIII. PATTERNS OF SOLID CIRCLES AND SQUARES. Proj. MICHIGAN, Rep. 2144 306 T, Dec. 1958, 25pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

To investigate visual recognition along various meridians of the visual field, linear arrays of square and circular elements (through point of fixation at angles of 0, 45, 90, and 135 degrees to the horizontal) were presented at two exposure durations (0.2 and 0.1 second) to both practiced and unpracticed observers. The task was to reproduce the patterns presented. Reproduction accuracy was analyzed for effect of angle of array and effect of experience. T. G. I. R 25

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14, 387

McFarland, R. A. HUMAN FACTORS IN VEHICULAR DESIGN AND OPERATION, WITH SPECIAL REFERENCE TO ACCIDENTS. Contract DA 49 007 MD 166, Feb. 1958, 45pp. Department of Industrial Hygiene, Harvard School of Public Health, Boston, Mass.

The application of human engineering principles and data to the design of vehicles in order to increase efficiency and safety has been emphasized in this project. An interdisciplinary team has carried out this series of "host-agent" studies, and also other investigations concerned with the influence of "host" factors and "host-environment" interactions in accidents. The results to date have been published in four monographs, three reports, and 25 articles in technical and professional journals. The work during 1957-58 has included additional literature search, a human factors analysis of the driver's work space in the automobile, development of apparatus and procedures of operator responses while driving, visual perception in relation to tinted windshields, and some accident studies. T. G. 1. R 26

14, 388

Tollhurst, G.C. SPEAKER INTELLIGIBILITY: A NOTE ON THE EFFECT OF MONAURALLY DELAYING AIRBORNE SIDE-TONE. Joint Proj. NM 18 02 99, Subtask 1, Rep. 84, Jan. 1959, 8pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To study the effects of monaural air-conducted side-tone delay using speaker intelligibility scores as the criterion measures. 48 speakers experienced such a delay. For one-half of the speakers, the delay occurred in the right ear and for the other half in the left ear. Each speaker experienced ten different time delays during his reading of multiple-choice intelligibility lists. Listening panels (12-15 listeners per panel) responded to the multiple-choice items and the resultant intelligibility scores were tabulated to yield a mean score for each speaker at each of the ten delay times. The data were studied by analysis of variance techniques for differences due to delay period and the ear affected. T. G. R 16

14, 389

Carroll, H. C. & Wildhack, W. A. (Chm.). PROVING GROUND INSTRUMENTATION. PAPERS PRESENTED AT A TECHNICAL SYMPOSIUM HELD AT AIR FORCE MISSILE TEST CENTER, PATRICK AIR FORCE BASE, COCOA, FLORIDA. APRIL 14 AND 15, 1955. June 1955, 147pp. American Ordnance Association, Washington, D. C.

This report contains 14 technical papers and four abstracts of papers presented at a symposium on proving ground instrumentation (defined as that apparatus used to evaluate materials and methods). Current instrumentation problems were covered in several broad areas (radar communications, fire control, statistical methods, and others) which are of general interest to all Services charged with the job of evaluating field equipments. T. G. 1. R 15

14, 390

Stoller, D.S. THE APPLICATION OF STATISTICAL METHODS TO THE DESIGN AND ANALYSIS OF EXPERIMENTS. Proving Ground Instrumentation Symposium, June 1955, 11-17. American Ordnance Association, Washington, D. C. (Rand Corporation, Santa Monica, Calif.).

This paper provides a general survey of some topics in statistics and operations research applicable to experimental design and analysis. Three general topics are discussed: test criteria, test designs, and test analyses. Although discussed separately, these concepts should be simultaneous considerations. T.

14, 391

Duffett, J.R. ELUCIDATION OF MEASUREMENT REQUIREMENTS BY STATISTICAL CONSIDERATIONS. Proving Ground Instrumentation Symposium, June 1955, 30-38. American Ordnance Association, Washington, D. C. (USA White Sands Proving Ground, Las Cruces, N. M.).

The viewpoint of the user of data - especially the viewpoint that different uses may require different criteria in the choice of an adequate measurement instrument - is emphasized in this paper. Four such uses which can be made are described: estimation of the mean, estimation of the standard deviation, quantitative explanation of each item in terms of the sources contributing to it, and the acceptance or rejection of each item in a lot. The Simon-Grubbs method for evaluating precision of measurement errors associated with the data was discussed.

14, 392

Dover, J.J. A CENTRALIZED DATA PROCESSING SYSTEM. Proving Ground Instrumentation Symposium, June 1955, 66-74. American Ordnance Association, Washington, D. C. (USAF Flight Test Center, Edwards AFB, Calif.).

This paper describes the need for and the different phases in the development of a centralized automatic data processing system at the Air Force Flight Test Center. The system consists of 1) a central ground processing facility, 2) an airborne magnetic

tape data recording system for flight test, 3) a magnetic tape data acquisition system for use at the Experimental Rocket Engine Test Facility, 4) a data acquisition system for space time information at the Experimental High Speed Track Facility, and 5) a digital data acquisition system for a radar phototheodolite used in space positioning. 1.

14, 393

Bartlett, N.R. & Bartlett, Susan C. SYNCHRONIZATION OF A MOTOR RESPONSE WITH AN ANTICIPATED SENSORY EVENT. *Psychol. Rev.*, July 1959, 66(4), 203-218. (University of Arizona, Tucson, Ariz.).

To investigate the ability to synchronize a motor response with a sensory event, a series of experiments was conducted. Both unpracticed and highly practiced subjects were studied as they attempted to press a button or throw a toggle switch in unison with one of a series of regularly spaced stimuli. Variables studied were motor mode of response (finger, hand, voice, toe), type of stimuli (auditory, visual, combination of both) and interval between stimuli (from 0.125 to 4.0 seconds). The data were comprised of errors--constant errors and standard deviations. The findings are related to the literature on reaction time. A simple theory is presented and discussed. T. G. R 22

14, 394

Badoyannis, G.M. THEORETICAL AND EXPERIMENTAL RESEARCH IN COMMUNICATION THEORY AND APPLICATION. PROGRESS REPORT NO. 6. Contract DA 36 039 SC 64704, SC Proj. 17 132B 0, 3 99 12 022, March 1956, 16pp. Bureau of Engineering Research, Rutgers University, New Brunswick, N.J.

This is a progress report of a research project in communication theory and application. Objectives for this quarter were 1) the partition of vowel and consonant sounds into two separate signals for proper parametric decomposition and tracking by the analyzer, and 2) means for the continuous analysis and synthesis of consonant sounds. The tasks accomplished during this period are discussed in the body of the report. G. 1.

14, 395

Brown, C.R. & Forsyth, D.M. FUSION CONTOUR FOR INTERMITTENT PHOTIC STIMULI OF ALTERNATING DURATION. *Science*, Feb. 1959, 129(3346), 390-391. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C. & Department of Psychology, Johns Hopkins University, Baltimore, Md.).

To study visual flicker as affected by intermittent photic stimuli of unequal periods, observations were made by two

subjects. Intermittent electric square waves composed of two alternating periods were used. Either of the two periods could be varied independently of the other. The test area subtended one-half degree of visual angle with a luminance of 1800 millilamberts. One period was set at a fixed value and the observer adjusted the other until a fusion point was obtained. In successive measurements the first period was increased by two millilamberts until no further fusion point was reached. The fusion data were analyzed as a function of the duration of alternate periods of stimulation. G. 1. R 4

14, 396

Berkowitz, S.M. THE ROLE OF SIMULATION IN AIR TRAFFIC CONTROL. Presented at the IRE Annual Meeting in New York City, March 19, 1957. Dec. 1957, 8pp. Franklin Institute Laboratories for Research & Development, Philadelphia, Penn. (Phileo Corporation, Philadelphia, Penn.).

This paper discusses real-time simulation in Air Traffic Control (ATC) as a way for the observers of an experimental operation to utilize their creative and intuitive insights into the problems. The present electromechanical dynamic simulator at the Civil Aeronautics Administration Technical Development Center in Indianapolis is described and its assets and limitations discussed. Plans for a new universal ATC simulator are discussed. R 3

14, 397

Beebe-Center, J.G. STANDARDS FOR USE OF THE GUST SCALE. *J. Psychol.*, 1949, 28, 411-419. (Harvard University, Cambridge, Mass.).

A set of standards is described for the practical measurement of taste strength. The standards consist of nine concentrations of aqueous solutions of sucrose, quinine sulfate, tartaric acid, and sodium chloride representing nine levels of sensory intensity extending from one gust (subjective taste intensity of one per cent solution of sucrose) to 100 gusts in steps of one-fourth log gusts. The use of the standards, their reliability, and degree to which they represent the taste characteristics of all foodstuffs are discussed. T. R 14

14, 398

Barnaby, R.S. THE BACKGROUND OF AIR TRAFFIC CONTROL. *J. Franklin Inst. Mono.*, May 1958, 5, 3-6. (The Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.).

This paper presents a brief, informal history of the development of air traffic, its problems and its control. The point is made that thus far the process has been for a

IV 163

problem to arise due to increased capabilities and numbers of aircraft and then a solution has to be provided. Many examples are given. The need for planning is pointed out.

14, 399

Andrews, T.G. & Dreese, M. MILITARY UTILIZATION OF PSYCHOLOGISTS DURING WORLD WAR II. Amer. Psychologist, Dec. 1948, 3(12), 533-538. (University of Chicago, Chicago, Ill. & George Washington University, Washington, D.C.).

To investigate the manner in which psychologists' services were utilized during World War II, survey data were gathered from 1561 psychologists who were in military service or government work connected with the military during that period. The questions covered the following general areas: extent of use made of professional training and skills, factors related to utilization of such skills, factors related to entrance into each of the several branches of military service, present work status, and factors related to trends in occupational shifts. Recommendations are offered for better organization and utilization of professional psychologists in the advent of another national emergency. T.

14, 400

Duerfeldt, C.H. INSTRUMENT FLIGHT IN HELICOPTERS, EVALUATION OF, REPORT # 1, INTERIM REPORT. Proj. TED PTR AE 7362.7, ST33 299, Aug. 1956, 13pp. USN Air Test Center, Naval Air Station, Md.

This is an interim report of a project conducted to evaluate the current flight capabilities of later model helicopters under actual and simulated instrument conditions. Primary emphasis was placed on evaluating the standard equipment in the helicopters. Recommendations are included. T. I. R 7

14, 401

Alexander, I.E. & Githler, F.J. THE EFFECTS OF JET ENGINE NOISE ON THE COCHLEAR RESPONSE OF THE GUINEA PIG. J. comp. physiol. Psychol., Dec. 1949, 42(6), 517-525. (Princeton University, Princeton, N.J.).

To investigate possible auditory hazards involved in the operation and maintenance of jet aircraft engines, guinea pigs were exposed in groups to the noise generated by a jet engine for a period of 15 minutes. The overall noise level at cage distance was in excess of 140 decibels with the spectrum from 80 to 8000 cycles. Cochlear responses of the animals were tested at three time intervals: immediately, one week, and three weeks. Unexposed animals were tested to serve as controls. The data were analyzed for hearing impairment and for amount of re-

covery at the various periods. An additional test was conducted on the effect of protection. Tentative explanations of the results are offered and the practical implications are discussed. G. R 6

14, 402

Brokaw, L.D. SCHOOL AND JOB VALIDATION OF SELECTION MEASURES FOR AIR TRAFFIC CONTROL TRAINING, Proj. 7719, Task 17108, WADC TN 59 39, April 1959, 14pp. USAF Personnel Lab., Lackland AFB, Tex.

In a program to improve selection procedures for trainees in the CAA Air Traffic Control School, a large battery of tests was administered to all trainees entering in the summer of 1958. Instructor ratings and lecture grades were collected at the end of the course. Approximately one year after the men had graduated they were identified on the job to collect supervisory ratings of their proficiency, as well as data on recommendations for promotion. A battery of tests suitable as a screening device was selected on the basis of the training validation. These tests were further analyzed for validity on the job criteria. T. R 1

14, 403

Brockhurst, R.J. & Lion, K.S. ANALYSIS OF OCULAR MOVEMENTS BY MEANS OF AN ELECTRICAL METHOD. A. M. A. Arch. Ophthalmol., Sept. 1951, 46, 311-314. (Massachusetts Institute of Technology, Cambridge, Mass.).

To study the eye movements and the extrinsic ocular muscles during movement, an electrical method was used which gave a direct record of velocity and acceleration of the eyeball as well as permitting measurement of the forces exercised by the extrinsic ocular muscles. Some typical records are presented along with a brief discussion and summary of the findings. 1.

14, 404

Briggs, G.E. DIMENSIONAL ANALYSIS OF SKILLED MOTOR PERFORMANCE. QUARTERLY REPORT. Contract AF 41(657) 70, Proj. 7707, R.F. Proj. 686, Rep. 12, March 1959, 5pp. Ohio State University Research Foundation, Columbus, Ohio.

This is a progress report on a research program concerned with investigating skilled motor performance. The major effort of the period was the preparation of the final report, "Skilled Performance." A list of reports, completed or in progress, is included. R 27

14, 405

Breakey, M.R. & Davis, H. COMPARISONS OF THRESHOLDS FOR SPEECH: WORD AND SENTENCE TESTS; RECEIVER

VS FIELD, AND MONAURAL VS BINAURAL LISTENING. *Laryngoscope*, March 1949, 59(3), 236-250. (Central Institute for the Deaf, St. Louis, Mo.).

To compare the relative difficulty of two tests of the threshold of speech as well as the absolute values for normal ears under various conditions of listening, ten normal-hearing and ten hard-of-hearing subjects were tested. Auditory Tests Number Nine (spondee words) and Number Twelve (sentences) of the Psycho-Acoustic Laboratory were administered monaurally and binaurally through headphones and for the "normals," binaurally from a loudspeaker. Threshold data for the two tests were compared for these conditions. Differences between "normal" and "hard-of-hearing" are discussed. T. R 8

14,406

Box, A. & Sell, R.G. ERGONOMIC INVESTIGATIONS INTO THE DESIGN OF MASTER CONTROLLERS. PE/NE/82/58, Aug. 1958, 20 pp. *The British Iron & Steel Research Association*, London, England.

This paper describes a series of laboratory experiments and work trials investigating the effects of certain design variables of hand- and foot-operated steelworks master controllers upon operating characteristics of the controllers. Basic procedure in each experiment was the use of a group of subjects to perform a series of standard tasks (aligning two pointers on a scale) using the controller. The variables were as follows: 1) foot controller--position of pivot relative to ankle, number of speed-steps, angle between extreme positions, and the operating torque; 2) hand controller--number of speed-steps, arc of movement of handle, length of handle, feel of controller, use of mechanical latch, etc. The findings are related to optimum combinations of design variables for most efficient work performance. T. I. R 9

14,407

Blackwell, H.R. EVALUATION OF THE NEURAL QUANTUM THEORY IN VISION. *Amer. J. Psychol.*, July 1953, LXVI, 397-408. (University of Michigan, Ann Arbor, Mich.).

The neural quantum theory, which is concerned with the fundamental nature of sensory discrimination, is examined for its relevance in the field of vision. The postulates of the theory are discussed. The experimental task was to evaluate the extent to which actual threshold data conformed to the theoretical quantum curves. The data were gathered from four subjects by the method of constant stimuli. Each of 14-18 values of the luminance increment was presented 20 times. The 20 values of the same increment were presented consecutively. Two groups

of 20 catch stimuli were presented in random order. The subject responded "yes" or "no" to each presentation. These conditions conformed to those required by the theory.

T. G. R 7

14,408

Berliner, H. J., Young, M. P. & Wall, G. F. MAN-MACHINE FACTORS IN THE NRL NUCLEAR REACTOR CONTROL SYSTEM. Proj. NR 401 000, Task 401 001, NRL Prob. Y02 03, NRL Rep. 5270, March 1959, 20 pp. *USN Research Lab.*, Washington, D. C.

One important problem in the design of a research reactor is the allocation of control responsibility among men and automatic equipment so as to achieve the maximum in safety, flexibility, and continuous operation. This report presents the man-machine considerations which led to defining the operator's task in the control system of the nuclear reactor at the U. S. Naval Research Laboratory and how these considerations were implemented in the original design. T. I. R 1

14,409

Cai, F., Maestrini, L. & Scarsini, G. THE TRAINING OF RAILWAY PERSONNEL IN STEELWORKS. PE/11/68/57, Jan./Feb. 1958, 79pp. *The British Iron & Steel Research Association*, London, England. (Societa Cornigliano, Genoa, Italy).

This paper deals with the training of railway personnel in steelworks under the following points: 1) job analysis and job evaluation in the transport departments; 2) selection of candidates; 3) theoretical and practical training; 4) advancement and promotion. Several appendices are included: 1) example of job analysis; 2) example of a psycho-technical examination; 3) training of mobile personnel on Italian state railways and training of personnel for local operations; 4) safety regulations for narrow gauge rail transport; and 5) safety regulations for interval works transport. T. G. 1.

14,410

Byram, G. M. & Jemison, G. M. SOME PRINCIPLES OF VISIBILITY AND THEIR APPLICATION TO FOREST FIRE DETECTION. *Tech. Bull.* 954, March 1948, 61pp. *US Department of Agriculture*, Washington, D. C. (Pacific Northwest Forest and Range Experiment Station, Portland, Ore.).

To develop ways of determining visual range, a measure useful in the efficient operation of forest fire detection systems, a series of long-range studies was undertaken. This report summarizes the findings of the studies under the following major topics: 1) visibility and the effect of haze upon it, 2) practical measurements of visibility distance (visibility meters, methods for estimating without instruments), and 3) application of findings to other fire detection problems

IV-165

(search methods, eye-test for lookouts, haze-penetrating filter, optical aids). The appendix contains the mathematical theory of visual range as well as additional information on the various devices. T. G. 1. R 31

14,411

Brown, W. L. & McDowell, A. A. VISUAL ACUITY PERFORMANCE OF NORMAL AND CHRONIC IRRADIATED MONKEYS. Rep. 58 149, Nov. 1958, 3pp. USAF School of Aviation Medicine, Randolph AFB, Tex. ((University of Texas, Austin, Tex.).

To determine the persistence of visual acuity deficit following radiation exposure, the performance of monkeys was investigated approximately three years after exposure. Six normal (controls), ten low-dose, nine intermediate-dose, and four high-dose irradiated rhesus monkeys were tested to a criterion of 21 correct responses (24 trials a day) for two successive days on each of eight visual acuity problems presented in order of increasing difficulty. Each problem required a choice between 1) circles and 2) circles with breaks in order to procure a food reward. The mean errors to criterion were analyzed for differences among groups at each problem level. T. G. 1. R 2

14,412

Brown, A. H. EVALUATION OF COMMERCIAL ELBOWS ADULT SIZE, ARTIFICIAL, EXTERNAL, STUMP-ACTUATED (OUTSIDE ELBOW HINGE WITH STUMP-ACTUATED LOCK). Tech. Rep. 5762, Dec. 1957, 7pp. USA Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.

Commercially available adult size external elbows (outside elbow hinge) with stump-actuated locking mechanism (A. S. Hosmer Corporation, Santa Clara, California) were evaluated and tested for compliance with Tentative Standards. Functional tests, physical strength tests, design and construction evaluation, and appearance evaluation were made and the results reported. I.

14,413

Caldwell, L. S. THE EFFECT OF ELBOW ANGLE AND BACK-SUPPORT HEIGHT ON THE STRENGTH OF HORIZONTAL PUSH BY THE HAND. Proj. 6 95 20 001, Task USAMRL T 3, MEDEA, Rep. 378, March 1959, 11pp. USA Medical Research Lab., Fort Knox, Ky.

To determine the effect of the elbow angle on the force of the push movement by the hand, nine subjects were tested. The task was to push on the handle of a dynamometer with as much force as possible while in a seated position. The strength of the push movement was measured at five elbow angles (60, 85, 110, 135 and 160 degrees). At each angle measurements were

made when there was no back support and with a back rest at 20, 40, 60 and 80 percent of the distance from seat to shoulder joint. The data were analyzed for the effects of angle, backrest, and their interactions. Consideration was given to the possible ways in which the arm might have produced the forces measured. T. G. 1. R 6

14,414

Camp, R. T., Jr. A TABLE FOR CONVERTING VOLTAGE TO SOUND PRESSURE LEVEL IN DECIBELS (0 DB = 0.0002 VOLT = 0.0002 DYNE/CM²). Proj. NM 18 02 11, Subtask 2, Rep. 1, Dec. 1958, 28pp. USN School of Aviation Medicine, Naval Air Station, Fla.

The measurement of sound pressure level of noise with a microphone system and a voltmeter involves the conversion of the output voltage of a microphone system into sound pressure level. Such conversions are often accomplished by laborious computations or by graphic means. A table was computed to facilitate a direct accurate conversion of output voltage into sound pressure level without the usual computation or interpolation. Directions for use of the table are included in the report. T.

14,416

McLester, W. TRAINING OF PERSONNEL FOR RAIL TRANSPORT IN IRON AND STEEL WORKS. PE/11/63/57, Feb. 1958, 4pp. Plant Engineering & Energy Div., British Iron and Steel Research Association, London, Eng.

This paper gives a brief outline of some aspects of training in a steelworks traffic department. The internal and external traffic services needed to maintain production levels in the Corby Works of Stewarts and Lloyds, Ltd. are described and the system employed in this plant to train shunters, drivers and supervisors is discussed.

14,417

McCutchan, J. W. & Isherwood, J. D. PREDICTION OF THERMAL TOLERANCE WHEN USING AN MA-2 VENTILATING GARMENT WITH A MODIFIED MK-IV ANTI-EXPOSURE SUIT. Contract AF 33(616) 5402, Proj. 7164, Task 71830, WADC TR 59 326, June 1959, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of California, Los Angeles, Calif.).

To provide a rational basis for the prediction of thermal tolerance when using an MA-2 ventilating garment with a modified MK-IV anti-exposure suit, physiological responses of human subjects were measured while wearing this combination and other garments comprising 2.15 clo of thermal resistance. Responses are shown graphically in terms of heat storage, heart rates, sweat rates, and composite indices of these

variables. A nomograph presents the equation, embodying the results, which predicts the cooling power of the garment. Directions for its use in predicting human tolerances are given. T. G. I. R II

14, 418

McDowell, A. A. & Brown, W. L. PERIPHERAL CUE LEARNING SET IN RHESUS MONKEYS. Rep. 59 4, Feb. 1959, 3pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas, Austin, Tex.).

Four control and nine chronic whole-body irradiated rhesus monkeys were tested on six four-trial peripheral cue learning set problems per day for 39 days. These monkeys had had previous experience on standardized learning set problems and in the utilization of peripheral cues to procure food rewards. The experiment investigated the effects of this prior experience on their present acquisition of peripheral cue learning sets. The data (percent errors) were analyzed for differences between trials, training periods, and subjects (normal versus irradiated monkeys). R 2

14, 419

McDowell, A. A. & Brown, W. L. VISUAL ACUITY PERFORMANCE OF NORMAL AND CHRONIC FOCAL-HEAD IRRADIATED MONKEYS. Rep. 59 5, Dec. 1958, 4pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas, Austin, Tex.).

To investigate the visual acuity performance of chronic focal-head monkeys in an effort to determine whether the massive radiation doses to which they had been subjected two years prior had resulted in a visual acuity deficit, six such monkeys and nine control monkeys were tested on each of eight visual acuity problems presented in order of increasing difficulty. Mean errors per day per problem were analyzed for differences between groups. Differences within the experimental group of irradiation of the frontal and the posterior association areas were further analyzed. T. G. I. R 3

14, 420

Peters, G. A. & Adams, B. B. DESIGNING CONTROL CONSOLES. Prod. Engng., April 1959, 2pp. (Santa Monica, Calif.).

Guides that will help arrange instruments and controls for time-saving and error-free operation are presented in tabular form. The advice is based on recent human factors research and provides better conditions for the human operator for both standing and seated operation. Ten basic considerations for the designer to keep in mind when designing consoles are given. T. I.

14, 421

National Defense Research Council, The Netherlands. THE INFLUENCE OF "ADAPTINOL" AND VITAMIN A ON NIGHT VISION. Tech. Rep. ONRL 73 52, July 1952, 6pp. USN Office of Naval Research, London, England.

A cooperative project, conducted by the Research Unit for Nutrition and the Research Unit for Observations, of the National Defense Research Council of The Netherlands, on the influence of "Adaptinol" and Vitamin A on night vision has been conducted and prepared for publication in the Dutch language. A summary in English, written by M. A. Bouman and others, is presented. Measurements were made for several weeks of the night vision capacity of three groups of 25 men aged between 19-22. The members of the three groups were given respectively "Adaptinol," cod liver oil containing 5000 I U Vitamin A, and salad oil. Measurements were made before, during, and after dosage. R 9

14, 422

George Washington University. BIBLIOGRAPHY OF REPORTS. ADDITIONS TO LIST FROM 30 JUNE 1958 TO 15 MARCH 1959. Human Resources Research Office, George Washington University, Washington, D. C.

This bibliography presents a list of reports from 30 June 1958 to 15 March 1959. Part I contains annotated technical, special and research reports issued by the Director's Office; Part II lists reports from the various Divisions and Research Units. R 26

14, 423

George Washington University. BRIEF ON HUMAN RESEARCH UNIT NR 1. Aug. 1955, 7pp. Human Resources Research Office, George Washington University, Washington, D. C.

This brief report describes the mission, personnel, research organization, and current program of Human Research Unit Nr1, CONARC, Fort Knox, Kentucky. The Unit is concerned with research in Army training, particularly in Armor. The staff is composed of both military and civilian personnel organized in various task forces presently concerned with research in effectiveness of tank crew team, performance in tank gunnery, tank driving and maintenance, and Armor communications.

14, 424

Zuidema, G. D., Cohen, S. I. & Silverman, A. J. CLINICAL EVALUATION OF LOW G TOLERANCE. Proj. 7216, Task 71712 & Proj. 7215, Task 71713, WADC TN 57 268, July 1958, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio

Twelve student pilots were referred to this laboratory for psychophysiological evaluation, following in-flight blackout episodes. The patients were studied by a team using cardiovascular, neuro-hormonal, bioelectric, psychologic, and psychiatric techniques. Illustrative case histories are given. The relationship of cardiovascular and psychophysiological factors in tolerance g forces is illustrated. R 13

14,425

Swanson, A. M. NOTES ON SIMULATION INSTRUMENTATION FOR MEASUREMENT OF PILOT PROFICIENCY. Proj. 7721, Task 47026, OL TM 57 3, May 1957, 43pp. USAF Operator Lab., Randolph AFB, Tex.

An investigation of the feasibility of obtaining pilot proficiency measures from oscillograph records of pilot performance in the B-52 Simulator (Type S-9) has been initiated. This paper discusses the integration of the recording equipment (Photron six-channel oscillograph) with the flight simulator, and the development of a plan for obtaining appropriate data to evaluate the utility of the instrumentation for the purpose desired. T. I.

14,426

Sitgreaves, Rosedith. PROBABILITY AND STATISTICS IN ITEM ANALYSIS AND CLASSIFICATION PROBLEMS OPTIMAL TEST DESIGN IN A SPECIAL TESTING SITUATION. Rep. 57 117, Sept. 1957, 35pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Columbia University, New York, N. Y.).

To evaluate the usefulness of various tests of abilities, such as those utilized in reaching decisions as to personnel assignments, and particularly to aid in the selection of items for such tests, a probability model for the testing situation is developed in some detail. The model examined here is based on an earlier model. G. R 5

14,427

Richey, Frances. A NOTE CONCERNING THE RADAR CONTRAST OF AIRPORT RUNWAYS. Contract AF 19(604) 1708, Sci. Rep. 2, AFRCR TN 57 198, Feb. 1957, 15pp. Research Laboratories, Hughes Aircraft Company, Culver City, Calif.

The radar contrast of a perfectly absorbing gap surrounded by reflecting semi-infinite half planes has been derived as a special example of a theory giving the radar contrast of any extended target complex. The radar contrast is defined in terms of the power received at the antenna and does not take into account the effects of noise. By comparing the contrast of an absorbing gap with that obtained for two point sources of angular separation equal to the width of the

gap, an explanation is given of the unexpectedly good results obtained by side-looking reconnaissance radars in resolving airport runways of angular widths four or five times smaller than a half-power beamwidth. G. I.

14,428

Von Gierke, H. E. & Pietrasanta, A. C. ACOUSTICAL CRITERIA FOR WORK SPACES, LIVING QUARTERS, AND OTHER AREAS ON AIR BASES. Contract AF 33(616) 3685, Proj. 7210, WADC TN 57 248, Nov. 1957, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report presents a summary of noise control criteria recommended for use in air base planning. The modifications of earlier criteria were necessitated by recent research which is reflected in this summary. Criteria are given for noise environments that allow safe and satisfactory performance of human functions in the following classes of occupied areas: living quarters; important communication centers; office areas; work and shop areas; group meeting, study, and rest areas; and hospitals. The criteria are described for each class. T. G. R 11

14,429

Peterson, R.O. & Jones, Edna, M. HUMAN FACTORS SUPPORT IN THE DESIGN AND USE OF THE REDSTONE FIRE UNIT PROFICIENCY ANALYSER. Contract N61339 69, Tech. Rep. NAVTRADEVEN 69 2, 162pp. USN Training Device Center, Port Washington, N. Y. (American Institute for Research, Pittsburgh, Penn.).

The Fire Unit Proficiency Analyzer, Device 3G15, is a training device to be used with operational equipment in training the Redstone missile firing battery. This study provides human factors recommendations for 1) the design of training equipment, 2) the use of the training equipment, and 3) a plan to field test the training system. A brief statement of the methodology used is also presented. Appendices present full data and information on the various phases of the study. T. I.

14,430

USA Aviation School Library. ARMY AVIATION. SPECIAL BIBLIOGRAPHY NO. 1. (REVISED). April 1959, 16pp. USA Aviation School, Fort Rucker, Ala.

This is a special bibliography on Army aviation. The references are listed under the following general headings: general, history, aircraft, maintenance, training, operations, helicopter operations, and future. Most of the references, with the exception of those in history, cover the period from 1955 through 1958. R 237

14,431

14,431

Guiguet, B. & Fedda, D. A PRELIMINARY STUDY OF MECHANICAL EXCAVATOR CABS. PE/NE/94/57, Sept. 1957, 20pp. Plant Engineering Div., British Iron and Steel Research Association, London, England.

A study was made of the cabs of mechanical excavators in order to determine what design modifications could be made to make the work less arduous and to increase productivity. A brief survey of excavators and their different equipment was made. Accident records were analyzed to determine what factors were responsible. Implications for redesign of equipment and for training of operators are discussed. A further study of training schemes led to the formulation of two selection tests based on the key demands of the task, to proposed training apparatus, and to comments of faulty design of cabs. Suggestions are made for the consideration of manufacturers and an outline of needed research is given. I. R 8

14,432

Canoga Corporation. NIKE INSTRUMENTATION RADAR SYSTEM. AFAC TECHNICAL NOTE XVII-A. QUARTERLY PROGRESS REPORT JULY, AUGUST, SEPTEMBER, 1956. Contract AF 08(616) 42, Canoga Rep. 7150 16, Oct. 1956, 18pp. Canoga Corporation, Van Nuys, Calif.

Progress of work on a contract to perform certain basic modifications to the NIKE radar system for the Air Force is reported. This is part of an extended research and development program in perfecting the most accurate and complete instrumentation radar system available for obtaining time-space-position ballistics data on bombs dropped from very high altitudes. The existing NIKE radar system is to be modified for this purpose. Specific details of the contract are given and the degree of completion of the various tasks is discussed.

14,433

Flight Safety Foundation Inc. INSTRUMENT PANELS-DELETHALIZATION. Human Factors Bull. 59 2H, 1p. Flight Safety Foundation Inc., New York, N. Y.

This bulletin demonstrates how the sudden deceleration of the skull against a rigid, firmly anchored instrument panel can produce pressures resulting in skull fracture, brain injury and death in an otherwise survivable accident. Methods of protecting the head from damage by suitable design are suggested. I. R 3

14,434

Grubmeyer, R. S. SYSTEMS ENGINEERING-A CHALLENGE TO THE AMB. J. Franklin Inst. Mono., May 1958, (5), 13-20. (Franklin Institute Laboratories

for Research and Development, Philadelphia, Penn.).

This paper discusses briefly the task of the Airways Modernization Board (AMB) in its role as the leader in a systems engineering approach to the air traffic control program. Some of the basic conflicts which AMB must face are discussed, some of the first steps taken are questioned, and suggestions are offered for a positive workable program.

14,435

Griffin, D. R., Hubbard, Ruth & Wald, G. THE SENSITIVITY OF THE HUMAN EYE TO INFRA-RED RADIATION. J. opt. Soc. Amer., July 1947, 37(7), 546-554. (Harvard University, Cambridge, Mass.).

To investigate the sensitivity of the eye to infra-red radiations, measurements were made in the near infra-red, in two areas of the dark adapted eye: the central fovea (cones) to 1000 millimicrons, and a peripheral area (primarily rods) to 1050 millimicrons. Determinations of the visual thresholds were made for radiation passing through a series of infra-red filters. Estimates of spectral sensitivity were derived from the data and sensitivity functions were chosen by successive approximation, which were consistent with the observed thresholds. Number of observers varied from 39 to 54. T. G. I. R 21

14,436

Green, M. R. & Muckler, F. A. SPEED OF REACHING TO CRITICAL CONTROL AREAS IN A FIGHTER-TYPE COCKPIT. Contract AF 33(616) 5472, Proj. 7184, WADC TR 58 687, June 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (The Martin Company, Baltimore, Md.).

To investigate basic speed of movement under optimum conditions to stimuli placed in various critical cockpit movement areas, ten subjects performed a positioning task. The subject, seated in a cockpit mock-up, was required to position his hands on the control stick, to extinguish a light by a toggle switch, and then to return his hand to the stick. The lights were located in nine critical control manipulation areas and placed symmetrically on right and left sides of cockpit. Response times in seconds were analyzed for effect of position of light and switch. T. I. R 6

14,437

Grehe, R. M. (Ed.). HANDBOOK OF TOXICOLOGY. TRANQUILIZERS. VOLUME IV. Proj. 7165, Task 71836, WADC TR 55 16, March 1959, 120pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report presents data on physical, chemical, biological, and toxicological properties of 26 tranquilizers, compiled from extensive literature references. Wherever possible, data are presented on molecular

formula and weight, structure, physical and chemical properties, pharmacology, clinical aspects, toxicity, and mode and site of action for each compound. The material is up-to-date at time of publication and has been carefully reviewed and authenticated by the contributors. Since the report is a survey, the values should be considered as "yardsticks" of activity rather than as absolute and definitive. R 358

14,438

Holtzman, W. H. THE UNBIASED ESTIMATE OF THE POPULATION VARIANCE AND STANDARD DEVIATION. *Amer. J. Psychol.*, Oct. 1950, 63(4), 615-617. (University of Texas, Austin, Tex.).

This note discusses the biased nature of the square root of the unbiased estimate of population variance for use as an estimate of the population standard deviation. A formula by which an unbiased estimate may be computed and also a table of correction factors to be used for various sample sizes from two to 30 are given. T.

14,439

Graybiel, A. & Hupp, Dorothy. THE OCULO-GYRAL ILLUSION: A FORM OF APPARENT MOTION WHICH MAY BE OBSERVED FOLLOWING STIMULATION OF THE SEMICIRCULAR CANALS. Proj. X148 (AV V4 3), Rep. Four, Nov. 1945, 26pp. *USN School of Aviation Medicine*, Naval Air Station, Fla.

The oculo-gyral illusion refers to a form of apparent motion resulting from the stimulation of the receptors in the semi-circular canals following angular accelerations. This study was undertaken to investigate some aspects of this illusion. Human subjects (four) were rotated in a modified Link Trainer, in a Barany chair, or on a human centrifuge and the illusory perceptions of motion were recorded. The chief variables concerned: 1) the nature or illumination of the fixation object, 2) the direction and strength of the stimulus, and 3) the position of the head of the subject. The importance of the findings for research and for night flying are discussed. T. G. R 18

14,440

Graybiel, A. DISORIENTATION IN PILOTS. Nov. 1948, 10pp. *USN School of Aviation Medicine*, Naval Air Station, Fla.

The problem of disorientation in pilots is considered in this paper. A partial outline of possible etiologic factors is presented under three main headings: the aerial environment, the plane, and the pilot. The physiogenesis of aviator's vertigo is reviewed and man's limited ability to cope with this form of disorientation is emphasized. Two forms of visual illusion, autokinesis and the oculo-gyral illusion, are discussed briefly and

their significance in aviation is commented upon. T. R 12

14,441

Graybiel, A. & Clark, B. THE AUTO-KINETIC ILLUSION AND ITS SIGNIFICANCE IN NIGHT FLYING. *J. aviat. Med.*, June 1945, 16(3), 111-151. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

This report is concerned with the autokinetic illusion (apparent movement of an object in a visual field when other visual references are inadequate) and its significance in aviation. Experiments were carried out both in the laboratory and during formation flights at night. The chief characteristics of the autokinetic movement were determined on approximately 500 subjects. The effect of various factors in reducing the illusion was tested: size, shape, numbers, arrangement in planes and distances, and actual movement of subject and/or target in various combinations. T. G. R 12

14,442

Gravendeel, D. W. & Plomp, R. MICRO-NOISE-TRAUMA? Rep. IZF 1959 1, 15pp. *Institute for Perception RVO-TNO*, Soesterberg, Netherlands.

To investigate the hearing damage that might be caused by the noise of light fire arms, audiograms were compared for three groups of young men: 1) 61 men who had been in shooting noise many times, 2) 48 recruits who had never been in shooting noise but had been exposed to industrial noise, and 3) 138 recruits who had never been exposed to either shooting or industrial noise. Maximal hearing loss and number of dips in the audiogram were analyzed for various frequency regions tested. The size, place, and form of the dips indicating hearing loss were examined carefully and an explanation proposed in terms of "micro-noise-trauma." T. G. R 25

14,443

Graybiel, A., Clark, B., MacCorquodale, K. & Hupp, Dorothy I. ROLE OF VESTIBULAR NYSTAGMUS IN THE VISUAL PERCEPTION OF A MOVING TARGET IN THE DARK. *Amer. J. Psychol.*, April 1946, 59(2), 259-266. (USN School of Aviation Medicine, Naval Air Station, Fla.).

This report is concerned with the illusory effects produced by rotation during the visual perception of a moving object. Six well-trained subjects reported their perceptions both during and following rotation while observing a moving target in the dark and in a lighted room. Rotation was at varying speeds (from two to 15 rotations per minute) both to the right and the left; the target path was circular, two meters distant and 15 degrees above eye level. The qualitative descriptions of the subjects are reported.

14,444

14,444

Goodnow, R. E., Beecher, H. K., Brazier, Mary A. B., Mosteller, F., et al. PHYSIOLOGICAL PERFORMANCE FOLLOWING A HYPNOTIC DOSE OF A BARBITURATE. *J. Pharm. & exper. Ther.*, May 1951, 102(1), 55-61. (Anesthesia Lab., Massachusetts General Hospital, Boston, Mass.).

To investigate the nature and duration of the neuro-muscular effects of pentobarbital sodium (generally employed as a hypnotic agent), each of 30 young men was studied in two test sessions. A battery of ten psychological tests, covering a range of functions from relatively simple (reaction time, tapping) to higher mental activities (memory) were employed. The first day of each test session was used to standardize activities prior to medication and for practice on the tests; 0.1 gram pentobarbital sodium or a lactose placebo were administered; on the second day post-medication testing started at 6:00 A. M. and continued at intervals until 11:00 P. M. Test data were analyzed for any effects due to the drug. T. R 14

14,445

Gottheil, E. & Bitterman, M. E. THE MEASUREMENT OF SHAPE-CONSTANCY. *Amer. J. Psychol.*, July 1951, 64(3), 406-408. (University of Texas, Austin, Tex.).

An apparatus for measuring and demonstrating shape constancy is described. Some results from a preliminary trial are given. I. R 5

14,446

Gordon, D. A. & Lee, G. B. MODEL SIMULATOR STUDIES-VISIBILITY OF MILITARY TARGETS AS RELATED TO ILLUMINANT POSITION. Proj. MICHIGAN, Rep. 2144 341 T, March 1959, 30pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

Experimental data are reported on detection and identification (class and name) for military targets observed in a small-scale model of an outdoor scene. The effects on visibility of lighting the targets with sources at various azimuths (elevation constant) and at various elevations through the median plane were determined. These source positions are those which might be occupied by searchlights or flares. Illumination was 0.02 and 2.0 foot-candles in separate experiments. The results are explained in terms of the underlying contrast situations and pattern effects of ground and foliage shadows. Suggestions are offered for applying the findings to military illumination practices. T. G. I. R 6

14,447

Guth, S. K. VISIBILITY. Q-E Review, May 1952, 4pp. (General Electric Co., Nela Park, Ohio.).

This paper describes a method for evaluating visibility on a definite numerical basis. The Luckiesh-Moss visibility meter that relates visibility of any object of visual task to a standard object is discussed and its practical uses are illustrated. Visibility and illumination level are discussed in some detail with a table of foot-candle levels for typical visual tasks included. T. G. I.

14,448

Hatch, T. F. HUMAN ASPECTS OF ENGINEERING. *Mech. Engng.*, May 1949, 406-408. (Industrial Hygiene Foundation, Mellon Institute, Pittsburgh, Penn.).

This paper considers criticisms that have been leveled against the lack of social effectiveness and responsibility of the engineer. It is argued that the scope and responsibility of the engineer should be broadened to the extent that the social and human problems can be defined in quantitative terms and dealt with in the ways of the engineer. Human engineering as a legitimate branch of the profession is discussed. R 4

14,449

de Brisson, A. & Legrand, P. THE MOTIVATION OF FLYING PERSONNEL. 2pp. Centre d'Etudes Psychologiques de l'Armée de l'Air, Versailles, France.

An abstract of a study of the motivations of flying personnel is given. It deals with results obtained from personal history questionnaires and from inquiries into hierarchical analyses of behavior of a sample of 500 pilot candidates. Three types of motivation were distinguished: flight, military, and hunting. A factorial analysis of quantified data was carried out.

14,450

Hamon, Surgeon General. ATTITUDE OF THE MILITARY AUTHORITIES TOWARDS SCIENTIFIC PSYCHOLOGY. March 1957, 5pp. Medical Research Council, London, England.

The writer maintains that the military will, of necessity, pay the greatest attention to whatever the techniques of scientific psychology can contribute towards the consolidation of the fighting value of the armies. After discussing the changing social structure of the military, permanent cadres versus numerous or changing contingents, the conclusion is reached that research in morale is greatly needed. Difficulties as well as opportunities in research of this kind are discussed.

IV-171

14,451

Holmes, W. J. CLINICAL APPLICATIONS OF NIGHT VISION TESTS. Trans. Amer. ophthal. Soc., 1951, XLVIII, 422-442.

Subjective and objective tests of scotopic vision which are of clinical usefulness in ophthalmic practice are indicated. The technique and clinical applications of rod scotometry, as quantitative means of differentiation in the diagnosis of various ocular, intracranial and systemic diseases, are discussed. Several theories regarding the basis of night-vision tests are suggested and a list of conditions in which scotopic examinations are of special value is appended. G. R 99

14,452

Kryter, K. D. SOME HUMAN FACTORS IN NOISE CONTROL. ca. 1957, 4pp. USAF Operational Applications Lab., Bolling AFB, Washington, D. C.

This paper describes briefly the manner in which results of experimental findings are applied by human engineers in the solution of problems resulting from the presence of noise in the environment of the human operator. The two problems dealt with are: 1) speech communications and 2) annoyance. R 7

14,453

Karwoski, T. F. & Wayner, M., Jr. STUDIES IN VISION: IV. THE INTERACTIONS OF RODS AND CONES IN AFTER-SENSATIONS. J. gen. Psychol., 1951, 44, 215-233. (Dept. of Psychology, Dartmouth College, Hanover, N. H.).

To investigate further a phenomenon in the after-image series (bleaching effect) which is manifested as a whitish dazzle of striking intensity, a moving slit of light (38 centimeters displacement; 76.4 centimeters per second movement rate) was observed in a dark room by five subjects who maintained fixation on a centrally located point of light. Intensity, wave-length and dark adaptation were varied to produce characteristic transformations of the after-effects. These transformations are described and explained in terms of rod-cone participation. I. R 12

14,454

Hodge, D. C. AN INVESTIGATION OF THE EFFECT OF VARIATION IN RIFLE SIGHTING RADIUS ON AIMING ERRORS UNDER TWO LEVELS OF ILLUMINATION. M. A. Thesis, 1959, 9pp. Texas Technological College, Lubbock, Tex.

To determine the effects of variations in rifle sighting radius (from 12 to 42 inches in six-inch increments) on aiming error at illumination levels of 50 and one foot-candles, 60 subjects were tested. The task was to align the mirror-image of a target with a set

of rifle sights and to mark a score sheet when satisfied with the sight-target alignment. The standard M1 rifle sights were used with six different widths of front sight posts to maintain same apparent sizes of front sight and target. Ten trials of ten shots each were given. The variable and constant errors of aiming were analyzed for effect of sighting radius and illumination. G. I. R 18

14,455

Hochberg, J. E. & Bitterman, M. E. FIGURAL AFTER-EFFECTS AS A FUNCTION OF THE RETINAL SIZE OF THE INSPECTION-FIGURE. Amer. J. Psychol., Jan. 1951, LXIV, 99-102. (Cornell University, Ithaca, N. Y. & University of Texas, Austin, Tex.).

To demonstrate the relation between figural after-effects and the area of the retinal region that is stimulated, ten subjects were tested in their ability to adjust a variable disk to apparent equality with a standard disk. Four conditions of satiation were used: 1) and 2) the inspection figure was varied only in size (satiation period of three minutes); 2) and 3) inspection figure was varied only in distance so that apparent size was varied; and 4) no inspection figure was used. The mean constant errors for ten determinations under each condition were compared. T. I. R 4

14,456

Hill, J. M. M. B. I. S. R. A. ACCIDENT RESEARCH. AN ACCOUNT OF WORK IN PROGRESS. PART I: INTRODUCTION AND COMMENTARY. ORS/112, Feb. 1957, 20pp. British Iron & Steel Research Association, London, England.

This report is an account of work in progress of industrial accidents along operational research lines. This approach considers accidents in their broadest aspects in relation to other personnel problems and with special reference to the human factor. The sample being studied includes all entrants to a certain steelworks in 1947. Their careers have been recorded over a period of four years. The data collected includes biographical records, previous employment records, all employment data from 1947-1951, dates and durations of all absences with reasons, and information on all accidents. The preliminary data is presented in a series of diagrams in Part II of this report (see 14,457). T.

14,457

Hill, J. M. M. B. I. S. R. A. ACCIDENT RESEARCH. PART II. DIAGRAMS. ORS/112, 27pp. British Iron & Steel Research Association, London, England.

These diagrams illustrate some of the preliminary results of the analysis of data on

human factors study of accidents in a British Steelworks industry. Part I presents the explanatory material (see 14,456). G.

14, 458

Hertzman, A. B. & Ferguson, I. D. FAILURE IN TEMPERATURE REGULATION DURING PROGRESSIVE DEHYDRATION. Contract AF 33(616) 3357, Proj. 7164, Task 71830, WADC TR 59 398, July 1959, 27pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Physiology, St. Louis University School of Medicine, St. Louis, Mo.).

To observe in detail the sweating responses, changes in body temperature, and changes in the digital and cutaneous circulation during dehydration, measurements were made on 14 young men. The subjects were exposed to an ambient temperature of 42.3 degrees C. (110 degrees F.) without food or water for a period of 12 hours. Pre- and post-exposure weights were taken and, during various periods of the exposure, the following items were recorded: weight losses, skin and oral temperatures, regional sweating rates, electrocardiograms, volume pulses in finger and toe pads, and urine outputs. In some experiments trachial blood pressures and flicker fusion frequencies were recorded. The data were analyzed as a function of time; theoretical implications are discussed.

T. G. R 44

14, 459

Hecht, S., Hendley, C. D., Ross, S. & Richmond, P. N. THE EFFECT OF EXPOSURE TO SUNLIGHT ON NIGHT VISION. Amer. J. Ophthalm., Dec. 1948, 31(12), 1573-1580. (Columbia University, New York, N. Y. & Ohio State University, Columbus, Ohio).

To investigate the length of time onset of dark adaptation remains above normal after exposure to sunlight, and whether such effects accumulate when people are exposed day after day, a series of measurements was made. 1) Subjects looked at the sky (3000 to 12,000 millilamberts) for periods of from four minutes to an hour and the course of dark adaptation was measured. 2) Similar measurements were made with sky brightnesses ranging from 3,500 to 16,000 millilamberts. 3) The effect of prolonged exposure was measured on two groups of 51 young men. One group was exposed from four to six hours daily for four weeks while the others were kept indoors; the groups were then reversed for two weeks. Implications for night vision are discussed.

T. G. R 10

14, 460

Hechter, H. H. THE RELATIONSHIP BETWEEN WEIGHT AND SOME ANTHROPOMETRIC MEASUREMENTS IN ADULT

MALES. USNRDL TR 206 NS 080 001, Dec. 1957, 16pp. USN Radiological Defense Lab., San Francisco, Calif.

To derive a functional relationship between weight and a set of concomitant body measurements, an analysis of measurements made by previous investigators (Behnke and Guttentag, Benke and Siri) on a sample of 31 male individuals was made. Using statistical regression analysis, equations were derived for predicting weight (either total or lean body). The relative importance of the anthropometric variables that were used are indicated. T. R 8

14, 461

Harcum, E. R. & Rabe, A. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD. III. PATTERNS OF BLACKENED CIRCLES IN AN EIGHT-CIRCLE TEMPLATE. Proj. MICHIGAN, Rep. 2144 294 T, Nov. 1958, 67pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

This is one of a series of studies investigating an observer's ability to identify targets composed of multiple elements having one of two possible forms (binary elements). Linear arrays of blackened or open circles were presented to the observers tachistoscopically at various locations in the visual field (0, 45, 90, or 135 degrees to the horizontal about the center of fixation in the frontal plane). The target was exposed for approximately 0.075 seconds and the observer attempted to reproduce the target pattern and position. Reproduction accuracy was analyzed for effect of target position along various meridians of the visual field. T. G. I. R 31

14, 462

Christensen, J. M. ENGINEERING FOR THE HUMAN. Psychology Branch, USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This paper defines the area of work called "Human Engineering," discusses its origin, and sketches briefly its recent history. The integrating effect this effort is having on related disciplines is noted. Certain deficiencies in the early work are discussed, and what is being done and what is being planned to correct these deficiencies are described. Primary stress is here placed upon systems research. Some suggested human factors research areas are listed in a supplement.

14, 463

Hale, H. B., Kratochvil, C. H. & Ellis, J. P., Jr. PLASMA CORTICOSTEROID LEVELS IN AIRCREWMEN AFTER LONG FLIGHTS. Rep. 59 15, Dec. 1958, 3pp. Dept. of Physiology and Biophysics, USAF School of Aviation Medicine, Randolph AFB, Tex.

To test the possibility that blood corticosteroid levels in aircrewmembers fatigued from prolonged flights become elevated, the fluorescence method of Sweat was used to determine hydrocortisone and a corticosterone fraction in blood. Pre- and post-flight venous blood samples were obtained from 44 men (members of nine crews) participating in training flights lasting 9 to 12 hours in B-52 aircraft. Values for the two samples were compared for differences. T. R 9

14,464

Hooton, E. A. BODY BUILD IN A SAMPLE OF THE UNITED STATES ARMY. PART I: BODY BUILD IN RELATION TO MILITARY FUNCTION. PART II: MEASUREMENTS OF BODY BUILD. Contract W44 109 QM 1078 & W44 109 QM 2014, Tech. Rep. EP 102, Feb. 1959, 348pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass. (Harvard University, Cambridge, Mass.).

This report presents data from two exhaustive investigations into the body shape and size of Army personnel. The sample represents males accepted for military service. Part I covers: 1) the general distribution of body types classified into 18 groups; 2) the military utility of each of the several groups, as indicated by the extent to which the various body types tended to be concentrated in distinct units and specialties; and 3) the correlations of the body build groups with all sociological and other data such as age, months of service, etc. Part II deals with the more important measures gathered on individual soldiers as such measures apply to various body types, previously determined from the photographs. T.

14,465

Ingram, W. T. ORIENTATION OF RESEARCH NEEDS ASSOCIATED WITH ENVIRONMENT OF CLOSED SPACES. Contract AF 18(603) 71, AFOSR TN 58 106, 21pp. USAF Office of Scientific Research, Baltimore, Md. (New York Univ., New York, N. Y.).

This paper presents an assessment and review of present knowledge of some problems involved in closed ecological systems and the techniques requisite to the handling, treatment and disposal or recycling of materials appearing as wastes and by-products of human occupancy of the closed space. Commentary and discussion of research needs are presented on the following topics: bodily wastes, waste handling and treatment—algae culture, CO₂-O₂ conversion, and closed air space. T. R 18

14,466

Jerger, J. F., Shedd, Joyce L. & Harford, E. ON THE DETECTION OF EXTREMELY SMALL CHANGES IN SOUND

INTENSITY. Rep. 58 127, Nov. 1958, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Audiology Lab., Northwestern University, Evanston, Ill.).

A unique method for the clinical assessment of differential intensity discrimination of sound is described. Short (200 milliseconds) one decibel intensity increments are superimposed, at five-second intervals, on a pure tone of constant amplitude at a sensation level of 20 decibels. The patient responds to the momentary increase in loudness. The procedure is called SISI (short increment sensitivity index) and results are expressed in terms of the percentage of 20 increments to which a response is made. Data on selected cases are reported to illustrate the manner in which the score varies with different kinds of hearing loss. T. G. R 26

14,467

Kahn, A. STEREOSCOPIC VISION-A FORM OF DEPTH PERCEPTION. Human Factors Data Bull. 36, March 1959, 3pp. Westinghouse Electric Corporation, Baltimore, Md.

The relationship between binocular disparity and the linear relationships that are required in stereoscopic pictures is demonstrated. The significance of the results for designing a three-dimensional radar display is discussed. G. I. R 1

14,468

Kahn, A. THE "F" TEST. Human Factors Data Bull. 34, Jan. 1959, 4pp. Westinghouse Electric Corporation, Baltimore, Md.

This bulletin discusses the use of the "F" statistic for studying differences between the means of several groups. An illustrative example is given demonstrating that it is possible to perform either a simple or a complicated analysis with the same data if the experiment is properly planned. T. R 3

14,469

Kahn, A. THE LIMITS OF DEPTH PERCEPTION. Human Factors Data Bull. 35, Feb. 1959, 3pp. Westinghouse Electric Corporation, Baltimore, Md.

The basic theory of three-dimensional sensing (depth perception) is discussed. The limits of disparity between which depth perception occurs and beyond which double images are obtained are shown as a function of the portion of the eye stimulated. It is suggested that these limits need to be considered in the construction of a three-dimensional display using the binocular disparity effect to display a coordinate. G. I. R 2

14, 470

14, 470

Kahn, A. THE USE OF ARTIFICIAL SIGNALS FOR THE DETECTION OF RARELY OCCURRING SIGNALS. Human Factors Data Bull. 37, April 1959, 3pp. Westinghouse Electric Corporation, Baltimore, Md.

This bulletin presents a brief summary of an experiment on human monitoring performance. To study ways in which such performance could be kept from deteriorating with time, artificial signals were introduced into a display panel of eight dials, the pointers of which all moved in a random fashion. Subjects were required to detect the movement of any one of the dial pointers into a crosshatched area on left of dial (real signal occurring 2.5 times in a two-hour watch) under two conditions: with an additional task of responding to movements of pointer to the right into a black area (artificial signal occurring every 75 seconds) and without this task. Performance was compared for these conditions. G. R I

14, 471

Laner, S. THEY "LEARN" NOT TO HAVE ACCIDENTS. Safety, Oct. 1958. (British Iron and Steel Research Association, London, England).

This paper discusses and gives examples of the kinds of analyses that can be made of accident records accumulated over a period of several years and points out the kinds of conclusions that can be drawn from them for accident prevention practices. The data used were records of new entrants into steel works as followed over a period of four years. The analyses show comparisons of accident rates for the first two years with those of the second two years in 1) types of accidents, 2) type of injuries, and 3) department in which they occurred. G.

14, 472

Laner, S. REASONS FOR EMPLOYEE RESISTANCE TO SAFETY EQUIPMENT. INTERIM REPORT ON PROTECTIVE FOOTWEAR. OR/19/57, Jan./Feb. 1958, 16pp. Operational Research Dept., British Iron & Steel Research Association, London, England.

This interim report contains the results of the first stage of an investigation concerned with factors which further or hinder the wearing of protective (steel toecap) boots and shoes in the steel industry. Details of protective footwear sales and of facilities that exist for selling such footwear on the work premises were obtained from 63 works. Facilities are classified as to size of the works: over 2000 employees and under 2000 employees. These facilities are then related to the sales figures. A selection of unsolicited remarks on some aspects of protective footwear is included in the report. T. G.

14, 473

Kinkade, R.G. & Kidd, J.S. THE EFFECT OF DIFFERENT PROPORTIONS OF MONITORED ELEMENTS ON OPERATOR PERFORMANCE IN A SIMULATED RADAR AIR TRAFFIC CONTROL SYSTEM. Contract AF 33(616) 3612, Proj. 7184, Task 71583; WADC TR 59 169, June 1959, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

A simulated radar approach control system was used to evaluate the influence of different levels of monitoring on system performance. Monitoring level was varied by manipulating the proportion of aircraft in the system having airborne position information (API) equipment. The API-equipped aircraft did not require active control of their approach path as did those aircraft not so equipped. Four conditions were compared: 100, 63, 37, and zero percent of aircraft with API equipment. Eight laboratory-trained controllers participated. Measures of system performance were safety (separation between aircraft) and efficiency (missed approaches, average number of planes processed, average delay, and average fuel consumption). Recommendations for the use of API equipment in terminal operations were made. T. G. R 11

14, 474

Keatinge, G. F. & Laner, S. SOME NOTES ON THE EFFECTS OF EXCESSIVE NOISE ON THE HEARING OF A GROUP OF WORKERS. Brit. J. industr. Med., 1958, 15, 273-275. (Butterley Company Limited, Ripley, Derby, England & British Iron and Steel Research Association, London, England).

To investigate the relationship between deterioration in hearing to prolonged exposure to intense intermittent noise, hearing assessment was made of all workers in three shops where riveting activities predominated. (Measurements of the noise and frequency analyses were also made.) The audiometric records of workers under the age of 40 years who had been exposed to the noise continuously for periods from one to seven years were analyzed. The results are discussed in relation to the use of protective devices. T. R 1

14, 475

Kearney, A.P., Mills, B.J. & Huey, R.S. EMERGENCY ESCAPE CAPSULE STUDIES. PHASE I: PRELIMINARY LABORATORY FLOTATION STUDIES. Proj. 6325, Task 63750, WADC TR 59 247(1), June 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

IV 175

Preliminary studies using aircraft canopy escape-type capsules as a primary survival vehicle are described. Design of capsule clothing, donning of clothing in confined space, stowage of emergency survival items, air exchange requirements, flotation, inhabitation and communication studies were conducted as individual facets of the program. These studies were culminated with a test in which a human subject remained in a closed capsule for 72 hours. Findings from these studies are presented. T. I.

14, 476

King, B. G. TIMES AVAILABLE FOR PROTECTIVE MEASURES IN EMERGENCIES AT HIGH ALTITUDE. April 1951, 10pp. Civil Aeronautics Administration, Washington, D. C.

The stresses that may act upon man in explosive or extremely rapid decompression are discussed under two categories: 1) the rapid or "instantaneous" stresses (air blast and gas expansion) and 2) the delayed stresses (anoxia, aeroembolism, and cold). Charts of tolerances of man breathing air at various atmospheric pressures and altitudes are presented. The data for the charts were based on data from various sources. An explanation of some aspects of breathing is appended. T. G. I. R 3

14, 477

Swearingen, J. J. PROTECTION OF PASSENGERS AND AIR CREW FROM BLAST EFFECTS OF EXPLOSIVE DECOMPRESSION. April 1951, 4pp. Civil Aeronautics Administration, Oklahoma City, Okla.

This report presents a summary of results of some studies of the effects of the air blast of explosive decompression on "passengers" seated at various distances from windows of the same dimensions as those found in recent aircraft. Two possible methods of protection of seated passengers and aircrew were observed and are discussed. G.

14, 478

Karwowski, T. F. & Lloyd, V. V. STUDIES IN VISION: V. THE ROLE OF CHROMATIC ABERRATION IN DEPTH PERCEPTION. J. gen. Psychol., 1951, 44, 159-173. (Dartmouth College, Hanover, N. H.).

To investigate the role of wave-length in perceiving depth, a series of experiments was performed. 1) Two spots of light of the same wave-length were viewed in a modified Howard-Dolman apparatus and judgments made as to which was the nearer. Yellow, red, green, and blue pairs of lights were judged in this manner. Accuracy of judgments as a function of spectral color was determined. 2) To test the hypothesis that the above judgments were due to chromatic

aberration (perceived as blurredness), observations were made of blue lights with the naked eye and with glasses which focussed the light on the retina. Also, rotating disks were used to obtain blurredness without color. Explanations of the results are discussed. T. I.

14, 479

Leverett, H. M. SOME ISSUES IN SCHOOL VISION SCREENING. Amer. J. Optom. & Arch. Amer. Acad. Optom., Feb. 1954, 31(2), 87-96. (American Optical Company, Southbridge, Mass.).

This bulletin discusses the following major topics: the need for visual care in the school population, methods for providing more adequate visual care, errors in screening, characteristics of visual health programs of importance to the schools, the role of the ophthalmic practitioners, and the need for applied research in school visual screening. R 4

14, 480

Lawrence, Merle. RECENT INVESTIGATIONS OF SOUND CONDUCTION. PART I. THE NORMAL EAR. Ann. Oto-, Rhino-, Laryngology, Dec. 1950, 59(4), 1020-1037. (Princeton University, Princeton, N. J.).

This paper discusses the contribution made by recent investigations to the knowledge of the manner in which vibrational forces of the air are transferred to the fluids in the normal ear with a minimum of energy sacrifice. The experimental studies described are concerned with the middle ear and revolve around three basic functions: 1) the matching of the properties of air to those of the perilymph, 2) the transmission of periodic vibrations with a minimum of alteration in their form, and 3) the provision of a protective mechanism for the prevention of damage to the inner ear structures. G. R 6

14, 481

Wever, E. G. RECENT INVESTIGATIONS OF SOUND CONDUCTION. PART II. THE EAR WITH CONDUCTIVE IMPAIRMENT. Ann. Oto-, Rhino-, Laryngology, Dec. 1950, 59(4), 48-42. (Princeton University, Princeton, N. J.).

This paper deals with the reception and transmission of aerial sounds in the ear with conductive impairment. Some of the common changes of the ear's conductive structure that result from accident, disease or deliberate surgical effort are discussed and suggestions are made how the general principles of sound conduction in the normal ear may apply. The following major topics are dealt with: 1) perforation and loss of the drum membrane, 2) interruption of the ossicular chain, 3) fixation of the ossicular chain, 4) the fenestration operation, 5) a physical theory of cochlear immobilization, 6) acoustic

14, 482

routes to the fenestrated ear, and 7) bone conduction in the otosclerotic ear. G. I. R 20

14, 482

Lazar, R.G. & Williams, J.R. INVESTIGATION OF NATURAL MOVEMENTS IN AZIMUTH AND ELEVATION LEVER CONTROL ADJUSTMENTS FOR HORIZONTAL AND VERTICAL POSITIONS. OCO Proj. TBI 1000, Tech. Memo. 3 59, April 1959, 25pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

To determine population stereotypes or "natural" movements involved in levers designed to control elevation and azimuth movements and to determine in which plane (horizontal or vertical) levers should be placed to effect better control, 128 Army enlisted personnel were tested on two types of control panels (one vertical and one horizontal with an azimuth and elevation control on each). A missile model was moved right, left, up, or down by the controls. The subject was instructed as to the direction the missile was to be pointed. Responses for direction of control movement and speed of response were recorded and analyzed. Recommendations are included. T. I. R 28

14, 483

Laner, S. THE HUMAN FACTOR. Safety, Feb. 1958, 2pp. OR/7/58 (British Iron and Steel Research Association, London, England).

This paper reviews an investigation of accidents at the Park Gate Iron and Steel Company, England. Only workers who joined the firm in 1947 were studied. The method used was to trace the workers' "lives with the company" from the day of entry onward. The number of accidents sustained over a four-year period was analyzed in terms of such factors as 1) length of employment, 2) six months or less employment versus more than six months, 3) number of "no reason" absences, and 4) newcomers versus re-entrants. The significance of the findings for management practices is discussed. G.

14, 484

Laner, S. RECORDING AND PRESENTING ACCIDENT DATA AT COMPANY LEVEL. OR/11/57, Jan./Feb. 1958, 16pp. Operational Research Dept., British Iron & Steel Research Association, London, England.

This report presents two useful methods of presenting accident rates graphically. One, the monthly accident control chart, makes it possible to compare a department's accident rate month by month with its own record. The other, the yearly interdepartmental comparison chart, shows rates of different departments within the same company. Both charts are adaptations of quality control charting techniques making allowance

both for scale effects (different sizes of departments) and for chance fluctuations in rates. Detailed instructions are given for plotting the charts. A type of record useful in determining the relative order of different causes for accidents is also given. T. G. R 3

14, 485

Malmö, R.B. CERTAIN PHYSIOLOGICAL CORRELATES OF PSYCHOMOTOR FUNCTIONING. Contract DA 49 007 MD 626 Jan. 1958, 16pp. USA Research and Development Div., Washington, D.C. (McGill University, Montreal, Quebec, Canada).

Experimental progress on three studies is reported: 1) physiological changes during tracking under conditions of sleep deprivation; 2) individual differences in patterning and level of physiological activity; and 3) electromyographic (EMG) reactions to strong auditory stimulation as a function of arousal level. In addition, progress is reported on the construction of a new tracking apparatus and a continuous amplitude/time analyzer for integrating EEG frequencies in the beta range. Publications supported in part by this contract are listed. R 12

14, 486

Lippert, S. A QUARTER CENTURY OF AIRCRAFT SEATING. Paper No. 59 AV 21. Jan. 1959, 8pp. The American Society of Mechanical Engineers, New York, N.Y. (Douglas Aircraft Company, Santa Monica, Calif.).

In the period 1933 to 1958 a number of advances in aircraft seat design have taken place. These changes are discussed by means of examples from Douglas built seats, and attention is given to the changing requirements imposed in the last 25 years. Safety, economy in use of materials, comfort and convenience are discussed. G. I. R 5

14, 487

Beebe-Center, J.G. & Waddell, D. A GENERAL PSYCHOLOGICAL SCALE OF TASTE. J. Psychol., 1948, 26, 517-524. (Harvard University, Cambridge, Mass.).

This investigation deals with the problem of defining a general psychological scale of taste strength on the basis of the specific scales published by D.R. Lewis. The first step established experimentally that cross qualitative matches with respect to subjective strength are possible in the field of taste. The next experiment established that, for solutions of sucrose and sodium chloride, pairs of hetero-qualitative solutions which are n times as strong as a pair of empirically matching solutions likewise match empirically. These results, based on data from two observers, were used to construct a general psychological scale of taste strength. The scale unit is named gust. T. G. R 9

44-177

14, 488

Lutz, C. C. DEVELOPMENT OF AN EMERGENCY PRESSURE SUIT (COVERALLS, HIGH-ALTITUDE, TYPE CSU-4/P). Contract AF 33(616) 3329, Proj. 6336, Task 63619, WADC TN 59 148, July 1959, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio

This report describes the various features evaluated during the development of Coveralls, High-Altitude, Type CSU-4/P. Each progressively improved prototype garment is described and test results are reported. The final model of the coverall is considered physiologically adequate to meet the specified requirements. Comfort and mobility features are compared to those of partial pressure suits. Preliminary flight test results are reported and an operational evaluation is recommended. T. I. R 7

14, 489

Cherniack, N. S., Hyde, A. S. & Zechman, F. W., Jr. THE EFFECT OF TRANSVERSE ACCELERATION ON PULMONARY FUNCTION. Proj. 7222, Task 71746, WADC TR 59 347, June 1959, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

The effect of forward acceleration of different respiratory factors was tested in 15 subjects during accelerations of two and three minute durations at three and five g on the human centrifuge. Minute volume, respiratory rate, tidal volume, maximum breathing capacity, 0.5 second timed vital capacity and total vital capacity were measured after acceleration. T. G. R 10

14, 490

Engel, H., Jr. STATIC LINE, TYPE T-10 TROOP PERSONNEL PARACHUTE-AERIAL, DYNAMIC, AND STATIC TESTS. Proj. 6071, WADC TN 55 364, Suppl. 1, Aug. 1957, 24pp. USAF Aeronautical Accessories Lab., Wright-Patterson AFB, Ohio.

To determine the effects of trooper collision during towing and the forces involved in the inadvertent opening of the reserve parachute of a towed trooper, a series of aerial tow tests was conducted. The towed dummy was first subjected to the forces of the reserve parachute. The collision forces were determined by towing one dummy and then launching a second. Forces were recorded at the static line aircraft attachment point as well as on the dummy. Test results were summarized and the implications for training procedures discussed. T. I. R 2

14, 491

Frank, W. E. ENGINEERING RESEARCH ON PROBLEMS RESULTING FROM SENSORY LOSS. Ann. N. Y. Acad. Sci., Sept. 1958, 74(1), 119-127. (Bioengineering Section, Franklin Institute Labs., Philadelphia, Penn.).

This paper discusses the need and value of the application of engineering effort to problems resulting from sensory loss. The work of the engineer on the guidance and communication problems of the blind is discussed in particular. Various guidance devices, such as obstacle detectors of various kinds, are described. Methods for converting printed material into speech and improved techniques for producing raised-dot (Braille) reading are discussed. The need for other devices and for rehabilitation studies are mentioned. R 16

14, 492

Dykhuizen, R. F. SOME MEDICAL ASPECTS OF CONTROLLED SUBMARINE ATMOSPHERIC CONDITIONS INCLUDING A METHOD OF DETERMINING THE METABOLIC REQUIREMENTS OF SUBMARINE PERSONNEL. XII(5), MRL Rep. 220, Oct. 1959, 9pp. USN Medical Research Lab., Submarine Base, Conn.

Three tests were conducted on board the U. S. S. PERCH (ASSP-313) which give information relative to prolonged survival in a man-regulated atmosphere. The equipment on this submarine for maintaining the carbon dioxide and oxygen concentrations at fairly constant levels made possible the study of effects in the field of (1) oxygen lack at normal barometric pressure when the carbon dioxide concentration is maintained at a constant but elevated level for varying lengths of time, and (2) carbon dioxide excess at normal barometric pressures when the oxygen content is maintained at 18 per cent or above for varying lengths of time. A method for determining the average caloric requirements of submarine personnel is included. R 2

14, 493

Lewis, D. R. PSYCHOLOGICAL SCALES OF TASTE. J. Psychol., 1948, 26, 437-446. (Dept. of Psychology, Harvard University, Cambridge, Mass.).

To establish psychological scales of taste intensity, four substances (in solution) were investigated: sodium chloride, sucrose, quinine sulphate, and tartaric acid. The procedure in each case was that of fractionation with observers selecting by taste, from a set of comparison concentrations, the one most nearly representing one-half the subjective strength of a standard concentration. This procedure was repeated at several levels of concentration for each of the four types of solution. From these data, scales for each type of solution were generated, both by algebraic and geometric procedures, relating psychological intensity in arbitrary units to physical concentration of the solution. T. G. R 14

14, 494

14, 494

Gilinsky, Alberta A. PERCEIVED SIZE AND DISTANCE IN VISUAL SPACE. *Psych. Rev.*, Nov. 1951, 58(6), 460-482.

A general unifying law of visual space perception is shown to be capable of rational derivation and quantitative formulation. Functions relating visually perceived size and distance to true size and distance are derived mathematically and then tested by application to recorded data of antecedent experiments and to new observations of perceived size and distance. The observed values are compared to those calculated from the basic formulas. T. G. R 19

14, 495

Carlisle, R. MODEL TECHNIQUES FOR COMMUNICATION SYSTEMS. DEVELOPMENT OF A MODEL TO SIMULATE MILITARY COMMUNICATION SYSTEMS. FIRST SEMI-ANNUAL REPORT 1 JULY 1956 TO 1 JANUARY 1957. Contract DA 36 039 SC 678-47, BRD 57 4C1, 39pp. Broadview Research and Development, Washington, D. C.

Work accomplished during the half-year ending 1 January 1957 on a research contract concerning model techniques for communications system is discussed. There are two major sections of the report: 1) a summary of the literature search, of the individual thinking, and of group discussions leading to problem definition; and 2) a report of experience with a preliminary model, progress with a more complete model, and plans for the future. 1.

14, 496

Farnsworth, D. STUDIES OF THE VISUAL PIGMENTS IN THE VISUAL RESEARCH DIVISION OF THE OPHTHALMOLOGICAL RESEARCH UNIT. ONRL TR 44 59, May 1959, 11pp. USN Office of Naval Research, London, England.

The history of the Visual Research Division of the Ophthalmological Research Unit in England is set forth briefly with a more detailed account of the research now being done on the role of visual pigments as mediators of vision. Physiological means being used are: 1) bleaching of visual pigments in solution and in suspension, and 2) reflection techniques in the living eye. The spectral transmission of the living human lens has been measured on subjects ranging in age from four to 63 years. A psychophysical study of pigments in color defectives is underway. G.

14, 497

Forrest, J. & Bennett, E. M. ESTHETICS RESEARCH IN HUMAN DESIGN. Sept. 1957, 11pp. Bio-Mechanics Lab., Tufts University, Medford, Mass.

In an attempt to evaluate the esthetic qualities of a major design modification of the telephone (American Telephone and Telegraph Company), 25 men and 25 women, most of whom use the telephone regularly for both business and pleasure, were questioned on their feelings with respect to the old model, the new model, and the ideal telephone. A multiple forced-choice procedure (polydiagnostic), consisting of 45 descriptive adjectives was used for obtaining judgments. Means and variances were calculated from the data and were compared for the three conditions: old, new, and ideal telephone. The assessment method was described in some detail. T. G. I. R 3

14, 498

Eddison, R. T. STATISTICAL ANALYSIS, ACCIDENT PREVENTION TRANSPORT AND WORKS OPERATIONS IN INDUSTRY. *Metal Treatment and Drop Forging*, Nov. 1954, XXI(10), 541-544.

This article discusses the work of the Operational Research section of B.I.S.R.A. (British Iron and Steel Research Association). The primary responsibility is to investigate the organization of operations in industry - the employment of resources and any relevant scientific techniques are applied in order to bring about higher efficiency. Certain aspects of work undertaken in various categories are discussed, with examples: 1) mechanizing research (computers), 2) accident studies, 3) transport and traffic, and 4) works operations.

14, 501

Finkelstein, Beatrice & McGhee, Bernice. LIQUID DIETS FOR USE IN HIGH-ALTITUDE, HIGH-PERFORMANCE VEHICLES. Proj. 7164, Task 71833, WADC TR 59 32, March 1959, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

In a search for significant life sciences information which will enable crews of high-altitude, high-performance vehicles to function efficiently, an evaluation of a liquid diet was made. A preliminary phase consisted of studies of 15 males who lived five days on a liquid diet, approximately 2600 calories and 115 grams of protein, while performing their usual laboratory duties. Criteria used to evaluate the diet included food consumption records, acceptability data, physiological effects, and psychological changes. The findings are discussed in relation to the utility of such a diet for extended periods of time. T. R 4

14, 502

Farnsworth, D. INTERNATIONAL SYMPOSIUM ON THE FUNDAMENTAL MECHANISMS OF THE CHROMATIC DISCRIMINATION IN ANIMALS AND MAN. ONRL TR C 1

IV-179

59, Jan. 1959, 15pp. USN Office of Naval Research, London, England.

The purpose of the Symposium was to gather leading scientists from all the fields of research in color vision and attempt to acquaint them with the status of each other's activities. The program was organized around two general topics: color vision of insects and of other animals; neurophysiology of the retina, of the pathways and centers, and hypotheses, including the trichromatic and opponent-color schemes. This report abstracts the items and arguments which may be new to workers outside of specialized research fields. I.

14, 503

Eatock, R. THE CHARACTERISTICS OF THE HUMAN OPERATOR AS AN ELEMENT IN A MONITORED CONTROL SYSTEM. A DESCRIPTION OF MODIFIED TEST EQUIPMENT (1957). SAU Rep. 1/58, RMCS EE R 51, Oct. 1958, 11pp. Technical Information and Library Services, Ministry of Supply, London, England. (Electrical Engineering Branch, Royal Military College of Science, London, England).

Experimental equipment is described which was constructed for research into the characteristics of the human operator as an element in a monitored control system. It was designed to train and test the operator in a displacement-displacement tracking task. Block diagrams of the equipment are given. I. R I

14, 504

Dimmick, F. L. & Farnsworth, D. VISUAL ACUITY TASKS IN A SUBMARINE. Proj. NM 003 041. 14.01, MRL Rep. 178, Oct. 1951, 14pp. USN Medical Research Lab., Naval Submarine Base, Conn.

To estimate the visual acuity required by submarine personnel below decks, a survey was made of the visual factors involved in all interior submarine tasks that an enlisted man may be required to perform. A complete measurement of every instrument that serves as a visual indicator for the performance of some task, together with range of distances and positions from which the cue must be read, the illumination, contrast ratios, shapes, etc. were obtained. The data were analyzed and discussed in relation to various visual standards. T. R I

14, 505

Gibbs, C. B. DEVICES AND DEVELOPMENTS IN ENGINEERING PSYCHOLOGY. J. Iron and Steel Inst., Oct. 1958, 190, 201-204. (Applied Psychology Research Unit, MRC, Cambridge, England).

This short paper on engineering psychology presents a brief history of this specialty and then proceeds to a discussion of the work done on visual indicators and

signals. Examples of redesigned manual indicators are given. This is followed by a general discussion of the psychological basis for the design of manual controls. The practical implications of psychological findings are discussed in relation to design of controllers. I.

14, 506

Forterre, M. RECRUITMENT AND TRAINING OF INTERNAL TRANSPORT AND HANDLING PERSONNEL AT THE THIONVILLE WORKS. PE/H/80/57, Jan. / Feb. 1958, 7pp. British Iron & Steel Research Association, London, England.

This paper discusses recruitment, selection, training, improvement, and promotion of personnel for the internal transport and handling departments of the particular steelworks (Thionville, France). The management of each of these areas is given in some detail with specific reference to crane drivers, shunters, drivers (electric, diesel-electric and steam locomotives), pointsmen, and motor vehicle drivers.

14, 507

Galanter, E. H. & Wilson, V. THE RELATION BETWEEN SCALES OF LOUDNESS AND THE DIFFERENCE LIMEN FOR AMPLITUDE DISCRIMINATION. PART 22. TED NAM EL 52004. HUMAN ENGINEERING INVESTIGATION OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT. Contract N156 33966, NAMC ACEL 398, Tech. Rep. 3, Feb. 1959, 25pp. USN Air Material Center, Philadelphia, Penn. (Dept. of Psychology, University of Pennsylvania, Philadelphia, Penn.).

This report is one of a series concerned with parameters relevant to the intelligibility of auditory stimuli for aircraft signal indicators. The results of three experiments are summarized: 1) a comparison of loudness functions derived from magnitude estimations with those derived from magnitude production, 2) the inter- and intra-individual reliability in producing loudness functions, and 3) the feasibility of predicting the slope parameter of the loudness function from individual difference threshold determinations. The results are used to frame recommendations for auditory warning signal devices in terms of their psychological effect on the operator. T. G. R 15

14, 508

Gainen, L., Levine, R. A. & McGlothlin, W. H. BASELOGS-A BASE LOGISTICS MANAGEMENT GAME. RM 2086, Jan. 1958, 17pp. Rand Corporation, Santa Monica, Calif.

This paper describes a game, Baselogs, which demonstrates the interactions between logistics and operations on a fighter-interceptor air base of the ADC (Air Defense Command) type. The player assumes the composite role

of: 1) director of finance at USAF and command level, and 2) director of base-level operations, supply, and maintenance at a simulated ADC-type base. The game may be used as a demonstration tool; it may also be valuable in the development of large-scale simulations for research on maintenance operations interactions. I. R 7

14, 509

Fregly, H. J. & Iampietro, P. F. DIETARY POTASSIUM SUPPLEMENTATION AND PERFORMANCE IN THE DESERT. Proj. Ref. 7 83 01 005B, Tech. Rep. EP 109, April 1959, 16pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass. (College of Medicine, University of Florida, Gainesville, Fla.).

To investigate the feasibility of enhancing operational capabilities by adding extra potassium to the soldier's diet when he is operating in a hot environment, 15 healthy male volunteers were studied for a period of five weeks. The first week was used for control measurements, following which two groups were formed—one being given a capsule containing supplementary potassium, the other a placebo each day in addition to a diet containing a normal amount of potassium. Performance ability was assessed by measurement of heart rates after a 4.5-mile hike in two hours, scores on the Harvard Step Test, electrocardiograms, and morning rectal temperatures. The sequence of physiological changes in the hot environment is discussed. T. G. R 15

14, 510

Moskowitz, W., Dylla, H. & Schoman, C. M., Jr. SUBMARINE GALLEY IMPROVEMENT BASED UPON INDUSTRIAL ENGINEERING STUDIES AND TECHNIQUES. Proj. NT002047, Subproj. CR 29(3)F, April 1958, 33pp. USN Supply Research & Development Facility, Bayonne, N. J.

An industrial engineering study of food preparation in a mock-up submarine galley was made utilizing time, flow, and motion study techniques. The operations of a qualified submarine commissaryman in preparing food during a 15-day menu period were charted. The relationship of items of equipment to each other, distances moved by commissaryman, and the percentage of work time spent at each piece of equipment were analyzed. This analysis provides a guide for a more efficient equipment arrangement. A new galley, occupying the same space, but requiring 30 per cent less movement to operate, was proposed. T. I. R 6

14, 511

Goldsmith, C. T. THE DETERMINATION OF THE DEGREE OF INTERACTION BETWEEN AUDITORY AND VISUAL SENSE

THRESHOLDS. Contract DA 30 069 ORD 1758, R&D Proj. 1634/A27842, June 1958, 48pp. USA Office of Ordnance Research, Washington, D. C. (Fordham University, New York, N. Y.).

To determine the extent of concomitant variability between visual and auditory channels when near-threshold signals are presented simultaneously, separate visual and auditory thresholds of five subjects were obtained ten times. Energy points representing each subject's average performance were selected and entered on a five by five matrix, such that subjects could be stimulated simultaneously with both types of signals with predictable probability of detection. Twenty sessions of the combined stimulus were given and performance compared to that for separately presented signals. These results were analyzed in terms of predictions from a model set up to test the hypothesis of independent variability of the two kinds of thresholds over time. T. G. I. R 14

14, 512

Gentry, G., Brown, W. L. & Overall, J. E. THE EFFECTS OF IONIZING RADIATION UPON THE TRANSPOSITION OF DISCRIMINATION HABITS OF RHESUS MONKEYS. Rep. 58 142, Nov. 1958, 5pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas, Austin, Tex.).

To determine the effect of ionizing radiation upon relational learning, 33 rhesus monkeys (representing five radiation dose levels) were trained on intermediate-size discrimination problems. A test of transposition was employed to determine the extent to which subjects of the different dose groups utilized relationships between stimuli as a basis for problem solution. T. G. R 17

14, 513

Gaylord, R. H. & Goldbeck, R. A. HUMAN ENGINEERING DESIGN RECOMMENDATIONS FOR MINIATURIZED EQUIPMENT. QUARTERLY REPORT NO. 1, 20 APRIL 1958 TO 1 AUGUST 1958. Contract DA 36 039 SC 75054 SCL 1904, Oct. 1957, 4pp. American Institute for Research, Washington, D. C.

This is a summary of progress of an investigation for the purpose of developing human factors engineering recommendations for designing miniaturized signal corps equipment. No data are included. The problem of changed human factors requirement with miniaturization is discussed, particularly as to maintenance access, maintenance labeling, labeling legibility, lower limits of spacings for operability, need for special components appropriate to reduction in size and special effects of reduced component size.

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14,514

Ufholz, L. M. THE MOTION PICTURE CAMERA IN INDUSTRY. From the Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 3pp. Industrial Management Society, Chicago, Ill. (American Greeting Corporation, Cleveland, Ohio).

This paper discusses the use of the motion picture camera as a working tool in the field of management. Some of the ways in which the camera has been used in a specific industry are discussed: a control medium for setting standards, new equipment purchase or development, operator training, exchange of knowledge and techniques, public relations, and employee relations. The equipment required for such purposes is discussed.

14,515

Nadler, G. CRITICAL ANALYSIS OF MOTION TIME SYSTEMS. Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., 1952, Nov. 5-7, 9pp. Industrial Management Society, Chicago, Ill. (Washington University, St. Louis, Mo.).

This paper presents a critical analysis of all predetermined motion-time systems. The assumption that each qualitative basic unit of work can be assigned a time value for rate-setting is shown to have inherent errors that do not appear to be capable of improvement. Evidence from experimental research, systems studies, and industrial applications are presented in evidence. Procedures for accurate and consistent standards are discussed. G. I.

14,516

Turney, C. LIMITATIONS AND USES OF JOB EVALUATION. Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 6pp. Industrial Management Society, Chicago, Ill. (A. T. Kearney & Company, Chicago, Ill.).

Job evaluation is defined here as a systematic method for determining the relative value of jobs within an organization. Five aspects of this technique that are considered as limiting factors are discussed: 1) the tool must be applied to jobs, not the individual worker, 2) the tool is systematic, not scientific, 3) jobs need to be rated in relationship to each other, 4) jobs are to be compared within a company or an organization, and 5) it is a long-range and continuing problem.

14,517

Middleswart, F. F. THE APPLICATION OF TIME STUDY AND METHODS TO MAINTENANCE. Proceedings of the Sixteenth Annual National Time and Motion Study and

Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 5pp. Industrial Management Society, Chicago, Ill. (E. I. du Pont de Nemours & Company, Wilmington, Del.).

This report describes factors leading to increased cost of maintenance work in recent years. It is argued here that the techniques of time study and methods can be applied to reduce this cost. The following six controls necessary for developing proper methods are discussed with examples from industrial application: 1) planning the job, 2) scheduling the job, 3) control of material, 4) control of tools, 5) preventive maintenance, and 6) maintenance cost analysis. The use of measurement is discussed in the following steps: 1) development of basic data, 2) development of application standards, 3) means of applying measurement, and 4) response of personnel. T.

14,518

Oakley, G. & Fecht, S. J. HOW TO TAKE INDUSTRIAL MOTION PICTURES. Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 19pp. Industrial Management Society, Chicago, Ill. (Bell & Howell Company, Chicago, Ill. & S. J. Fecht & Associates, Chicago, Ill.).

This discussion covers the uses of motion picture photography in industry, their advantages and disadvantages. The equipment required to take industrial motion pictures is listed and discussed, and a rough procedure for taking the pictures is described. This discussion was presented to introduce the subject to a group of industrial engineers; therefore the questions from the floor and the answers cover many practical aspects of the use of this tool in industrial work. I.

14,519

Morrissey, J. BASIC TIME STUDY PROGRAM AND TRAINING. Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 7pp. Industrial Management Society, Chicago, Ill. (Zenith Radio Corporation, Chicago, Ill. & U. S. Steel Corporation, Gary, Ind.).

The in-plant training program for Time Study Engineers at Zenith Radio Corporation is described in detail. The program is all-inclusive, beginning at the point of hiring and lasting during the whole period that the employee is in the Industrial Engineering Department. The need for such a program, its objectives, and a final evaluation of its worth are discussed. G. I.

14,520

Whaley, R. L. THE APPLICATION OF ELEMENTAL TIME STANDARDS. Proceedings of the Sixteenth Annual National Time

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and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 4pp. Industrial Management Society, Chicago, Ill.

(Western Electric Company, Kearny, N. J.).

This paper discusses the applications of elemental time standards (a work measurement system of predetermined time values applicable to motion elements of manual work) in industry, with specific application to Western Electric Company plants. Their most frequent application is for establishing incentive rates; other uses are manufacturing planning, maintenance changes, evaluating labor savings in employee suggestions, and the like. The limitations of these standards are also pointed out.

14, 521

Landes, R. H. (Chm.). SIXTEENTH ANNUAL NATIONAL TIME AND MOTION STUDY AND MANAGEMENT CLINIC PROCEEDINGS, CHICAGO, ILL., NOV. 5-7, 1952. 1953, 162pp. Industrial Management Society, Chicago, Ill.

These proceedings contain the papers given and subsequent discussions at a three-day Time and Motion Study and Management Clinic. The topics treated include new techniques and methods and new applications of others. Some demonstrations and panel discussions are included. T. G. 1. R 28

14, 522

Barnes, G. H. DATA REDUCTION EQUIPMENT FOR THE ANALYSIS OF HUMAN TRACKING. Contract AF 33(616) 270. Final Rep. F 2333, May 1953, 35pp. Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.

In the study of feedback systems a linear component is normally characterized by its transfer function (the ratio of output to input signal as a function of frequency). The characterization for a non-linear component, say the pilot of an airplane, is much more difficult and requires new techniques. Such a new technique is the Data Reduction System described in this report. Spectra and cross-spectra in human tracking experiments can be determined and descriptive functions for human trackers found. The equipment has been subjected to tests of validity and it is to be used in conjunction with a flight simulator for analyzing pilot tracking. 1. R 11

14, 523

Basore, B. L. & Davis, L. W. SURVEY: NOISE-PERTURBED FEEDBACK IN COMMUNICATIONS. Contract AF 30(602) 1890, Proj. 4519, Task 45541, QR 1 1004, RADC TN 58 295, Aug. 1958, 12pp. The Dikewood Corporation, Albuquerque, N. M.

This Technical Note issues from a research project concerned with the applications of information theory in certain areas. A summary is presented of the status of one

specific area: performance of a communication link with a noise-perturbed feedback link. Accounts in the literature are discussed which show that feedback can be used to reduce the final probability of error in the decision process taking place at the receiver. The manner in which this is accomplished is discussed and recommendations for further study are made. G. R 4

14, 524

Berlin, N. I. MILITARY ASPECTS OF THE BIOLOGICAL EFFECTS OF RADIATION. Rep. AFSWP 611, Nov. 1956, 54pp. US Armed Forces Special Weapons Project, Washington, D. C.

This document reviews mammalian radiobiology as applicable to man and from the standpoint of military medicine. Particular attention is paid to the dosimetric considerations and the quantitation of biological effect. Wherever possible, areas of controversy are reviewed and evaluated. The major sections of the document are: 1) introduction; sources of data, types of hazards, sources of radiation; 2) external radiation; 3) concept of relative biological effectiveness; 4) acute radiation sickness; 5) long term (late) effects; 6) genetic effects; 7) effects of fractionation and protraction; 8) internal contamination; 9) combined injuries; and 10) tolerance. T. G. R 67

14, 525

Bittini, M. ON THE FUSION CONDITIONS OF A COLORED FLICKERING FIELD. Atti Della Fondazione Giorgio Ronchi, Sept. - Oct. 1958, XIII(5), 442-448. AFOSR TN 59 121.

To determine the luminance at which fusion occurs when the frequency of interruption of the stimulus is varied between six and sixty pulses per second, for a one degree test-field (green, red, and blue), fusion thresholds were measured at the fovea and at ten degrees in the periphery. Both a sequence of rectangular and a sequence of saw-toothed stimuli were used. The data were analyzed to show the effect of color and light-pulse shape on critical luminance. G. 1. R 10

14, 527

Botsch, F. W., Powers, J. J. & Koch, A. A. ENVIRONMENTAL PROTECTION RESEARCH BY MEANS OF RADIO TELEMETRY 1. TELEMETRIC INSTRUMENTATION AND EXAMPLES OF FIELD USE IN STUDYING THE MAN-CLOTHING-ENVIRONMENT SYSTEM. Proj. 7 83 01 006, Tech. Rep. EP 119, Oct. 1959, 26pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

This report describes a frequency-type radio telemeter and automatic data reduction equipment designed to sense, transmit, and reduce biophysical data obtained from soldiers performing military-type activities

during field exercises. The telemeter permits remote recording of temperature, pressure, relative humidity, air movement, heart rate, and breathing rate with provision for converting transmitted data into analog or digitized read-out or into a form adaptable to International Business Machines computation. Telemetered temperature-time variations are presented to show the nature of the data that has been collected. G. I. R 27

14, 528

Burkhart, K. CONTRIBUTION TO THE THEORY OF OBLIQUE VISION. (BEITRAG ZUR THEORIE DER SCHRAEGSICHT). TIL/T 4867, Dec. 1958, 9pp. Technical Information and Library Services, Ministry of Supply, London, England.

An exact formula is developed to replace the graphical determination of visual range in inhomogeneous conditions. A further method of finding the range of oblique or spatial vision graphically or by calculation is described. Two examples are fully calculated. By means of infinitesimal boundary transition the connection with L. Foitzik's approximate vision formula is established. Finally, a correction term is determined for various target angles. T. G.

14, 529

USA Aviation Board. EVALUATION OF THE GRIMES TYPE COCKPIT LIGHT MODEL D-6810A-A (AMBER AND RED LENSES). REPORT OF PROJECT NR AVN 2358. Proj. NR AVN 2358, Sept. 1958, 5pp. USA Aviation Board, Fort Rucker, Ala.

To determine the suitability of the Grimes Cockpit Light, Model D-6810A-A, for Army use, the light was installed in the cockpit of an aircraft. Informal evaluations were made during night flights (approximately 40 hours). Four different light beams are provided by the light (flood or spot, red or amber). Recommendations are included.

14, 530

Carmichael, L. READING AND VISUAL FATIGUE. Proc. Amer. Phil. Soc., March 1948, 92(1), 41-42. (Smithsonian Institute, Washington, D. C.).

This is a summary of an experimental study of visual fatigue, in which 20 high school and 20 college subjects read for each of two six-hour periods. Half of each group read from books and the other half from microfilm projections of the same books. Illumination level on the pages of the books was approximately 16 candles. Multiple-choice tests on content were answered at the end of every 25 pages of reading. Continuous records were made of all eye movements. The visual acuity and stereoscopic acuity of each subject were measured before and after

each period and subjective comments were recorded. All records were analyzed for work decrements due to the prolonged reading. R 1

14, 531

Chase, R. A., Sutton, S. & First, Daphne. BIBLIOGRAPHY: DELAYED AUDITORY FEEDBACK. Dec. 1958, 13pp. Communications Lab., Department of Biometrics Research, New York State Department of Mental Hygiene, N. Y.

This bibliography consists of 101 items on the area of delayed auditory feedback and 46 related papers. The first set of items represents a systematic review of published literature for the period 1950-1958; the second set comprises items felt to be pertinent to questions raised by research in the area, but does not represent a systematic search. R 147

14, 532

Chase, R. A. EFFECT OF DELAYED AUDITORY FEEDBACK ON THE REPETITION OF SPEECH SOUNDS. J. Speech Dis., Nov. 1958, 23(5), 583-590. (College of Physicians and Surgeons, Columbia University, New York, N. Y.).

The idea that the condition of delayed auditory feedback facilitates the circulation and recirculation of speech units in the speech-auditory feedback loop (thus accounting for the observed increase in phonation time) suggested that it is possible to repeat the speech sound (b) more times in a five-second period under delayed feedback than under normal conditions. This hypothesis was tested experimentally with 20 subjects. Possible mechanisms accounting for the observed effects and applications of the research to the study of stuttering are indicated. T. G. I. R 14

14, 533

Chase, R. A., Harvey, S., Standfast, Susan, Rapin, Isabelle, et al. A COMPARISON OF THE EFFECTS OF DELAYED AUDITORY FEEDBACK ON SPEECH AND KEY TAPPING. Dec. 1958, 5pp. Communications Lab., Department of Biometrics Research, New York State Department of Mental Hygiene, N. Y.

To compare the effects of delayed auditory feedback on speech and on non-vocal tasks, each of 14 subjects was asked to repeat the speech sound *b* as in "book" in groups of three. Vocal output was first amplified and returned without delay; a delay of 244 milliseconds was then introduced. Vocal performance was recorded and analyzed for effects of the delay. Each subject was then required to tap a key that hit a strip of spring steel with a strain gauge mounted on it; auditory feedback was handled as above. Records

14, 534

of time and pressure characteristics of key-tapping performance were analyzed for effects of delay and compared with results of vocal performance. R 3

14, 534

Chauncey, H. H. & Shannon, I. L.
PAROTID GLAND SECRETION RATE AS A METHOD FOR MEASURING RESPONSE TO GUSTATORY AND MASTICATORY STIMULI IN HUMANS. Rep. 59 66, May 1959, 7pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

To develop a new approach to the quantitative determination of the effect of gustatory and masticatory stimuli, parotid gland secretion rate was employed to measure response elicited. Four gustatory stimuli (citric acid, sodium chloride, sucrose, and quinine sulphate) and three masticatory stimuli (gum base, paraffin, and rubber bands) were used with 216 male subjects. A plot of secretory response against its corresponding affector intensity--bolus volume (masticatory), or application rate (gustatory)--was constructed, the relationship was expressed mathematically and the maximal response and reflex equilibrium constant for the different stimuli were calculated. T. G. R 5

14, 535

Christensen, K. K. & Johnson, L. L.
STUDY TO DETERMINE METHODS OF SIMULATING G EFFECTS. Contract AF 33(600) 37276, WADC TN 58 314, Oct. 1958, 108pp. USAF Aeronautical Accessories Research Lab., Wright-Patterson AFB, Ohio. (Armour Research Foundation, Illinois Institute of Technology, Chicago, Ill.).

To determine methods of simulating acceleration and deceleration sensations in aircraft flight simulators (without actually producing them), the following steps were taken. A literature survey was made to ascertain the significant sensations and studies were conducted of methods for mechanically inducing heaviness and immobility sensations, chemically inducing physiological effects, psychologically inducing effects of acceleration, and controlling the various simulated effects. Several devices that may indirectly induce acceleration effects were investigated. Recommendations as to the feasibility of simulation are made. T. G. I. R 115

14, 536

Curran, H. T. Jr. & Gschwind, R. T.
EVALUATION OF SIGHTING DEVICES FOR A SMALL HAND-HELD ROCKET LAUNCHER. Tech. Memo. 6 59, Sept. 1959, 19pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

The degree of difference in accuracy due to aiming error among three types of experimental sighting devices was investigated. The sights were: 1) an iron sight with a 20-inch sight radius utilizing a plexiglass plate upon

which a reticle was etched for the front post, 2) a unity-power optic using singlet lenses, and 3) a unity-power optic using doublet lenses. Twenty-eight Infantry men were used as subjects. Both qualitative and quantitative disparities among the sights were ascertained. Possible effects of low illumination sighting are discussed. T. I. R 6

14, 537

Dodson, H. L. COCKPIT VISIBILITY, MEASUREMENT OF. FINAL REPORT. Proj. TED PTR SI 5002, ST33 82, Rep. 1, April 1958, 14pp. USN Air Test Center, Naval Air Station, Md.

Measurements of the cockpit downward visual cut-offs of several late model Naval airplanes were made. For these tests, the airplanes were jacked to pitch angles approximating that of the power approach condition, and measurements were made with the pilot's head both in the design normal eye position and as far to the left as would be safe and comfortable to maintain in flight. The data are presented in tabular form as angles of depression from the horizontal. Pilot responses concerning internal fogging and effect of rain on visibility from cockpit are also reported. T.

14, 538

Du Mas, F. M. CATINUA. CATEMEN- SIONS, CATESCALES. J. clin. Psychol., April 1951, VII(2), 112-117. (University of Texas, Austin, Tex.).

This paper introduces several new concepts and indicates their utility for science in general and clinical and applied psychology in particular. A rational analysis of certain concepts and their associated phenomena is presented. The major objective is to lay out a guide for the construction of information files (case histories, biographical data sheets, interview forms, etc.) that systematize and order these data so that a more coherent picture of the individual is obtained and also quantify sub-domains of information. Definitions and illustrations of the following concepts are given: catinuum, catemension, and catescale. T.

14, 539

Elam, J. O. & Greene, D. G. (Princ. Investigators). STUDIES ON RESUSCITATION AND ARTIFICIAL RESPIRATION. Contracts DA 49 007 MD 507 & DA 49 007 MD 209, Prog. Rep. 1, Feb. 1958 - Nov. 1958, 31pp. USA Research & Development Div., Office of the Surgeon General, Washington, D. C.

Five studies on resuscitation and artificial respiration are reported. 1) Physiological management of ventilation during anesthesia: measurements of arterial pH

and expired CO₂ were correlated with intervals of mild hyperventilation alternating with mild hypoventilation produced by a servo ventilator in 48 surgical patients anesthetized with common agents. Clinical advantages of mechanical ventilation were reported. 2) Training requirements in resuscitation: evaluation of several methods in progress. 3) Evaluation of Edgewood Resuscitator: this tidal-volume device was used on 118 patients; results were given. 4) Mask-to-mask resuscitator: two innovations were described. 5) Resuscitation studies: a new tracheal pickup device was constructed, and a documentary film was made. T. G. 1. R 11

14, 540

Elkin, E.H. EFFECTS OF SCALE SHAPE, EXPOSURE TIME, AND DISPLAY-RESPONSE COMPLEXITY ON SCALE READING EFFICIENCY. Contract AF 33(616) 3612, Proj. 7184, WADC TR 58 472, Feb. 1959, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

Three scale-reading variables were examined in both quantitative and qualitative reading tasks. The variables were: three scale shapes (circular, vertical, and open-window); four exposure conditions (120, 360, 1080 milliseconds, and termination by subject's response); two degrees of display complexity (100 and 20 intervals), and three of response complexity (reading to nearest five, to nearest one, and high, low or OK). The scales were exposed tachistoscopically and the subject's oral response time was measured; error scores were also recorded. The data were analyzed in terms of the relative merits of each variable and how it interacts with the others. T. I. R 13

14, 541

Eidemiller, R. L. EXPERIMENTAL DESIGNS AND USEFUL TECHNIQUES OF ANALYSIS. NOTS Tech. Publ. 2186, NAVORD Rep. 6466, April 1959, 60pp. USN Ordnance Test Station, China Lake, Calif.

The planning and conducting of statistically designed experiments and the selection of actual designs are discussed. Several techniques useful in the analysis of experimental data are: 1) an International Business Machines 704 program for computation and analysis, 2) two methods for estimating missing values, 3) Tukey's method for individual mean comparisons, 4) attribute analysis techniques including Fisher's "Exact Method," and Batson's proposed "Factorial Chi-Square Analysis," and 5) Box's technique for optimizing a response surface. The appendices contain many fractional factorial designs ready for use and a direct entry table for Fisher's exact method for analyzing a two by two contingency table. T. G.

14, 542

Farnsworth, D. VISUAL RESEARCH IN SCOTLAND. Tech. Rep. ONRL 12 59, Feb. 1959, 11pp. USN Office of Naval Research, London, England.

This is a review of present-day research in vision in the universities of Scotland. Included are the studies of R. W. Pickford in color blindness and abnormal psychology at Glasgow; of E. D. Fraser, J. R. Symons, and R. L. Reid in various perceptual problems, including intrasensory facilitation, at Aberdeen; several studies at Edinburgh; and the new studies on the effect of age on color discrimination by R. Lakowski at the Applied Psychology Unit, Edinburgh. T. G. 1.

14, 543

Faulds, B. THE PERCEPTION OF PITCH IN MUSIC. Contract NONR 1858 (15), Proj. NR 150 088, National Science Foundation Grant G 642, May 1959, 87pp. Psychology Department, Princeton University, Princeton, N. J.

This study examines the sense of pitch in a variety of situations, some musical and others not, with the object of deciding how best to predict success in musical studies. A battery of 14 auditory tests was devised and given to two groups of subjects: 67 freshmen from a college of music and 35 freshmen from a liberal arts college. The scores were studied by factor analysis techniques to identify underlying factors in the tests. Factor scores were then computed for the subjects and used as predictors of the college of any given subject. The main contributions of this study for testing musical aptitudes are discussed. T. R. 35

14, 544

Felton, W. W. BACKGROUND OF AIR TRAFFIC CONTROL SYSTEMS ENGINEERING. J. Franklin Institute Mono., May 1958, 5, 7-12.

A brief review of systems engineering in the development of a common system for air navigation and traffic control is presented. Examples are given of progress in developing and using the steps and tools of systems engineering: 1) operations analysis, 2) problem formulation, 3) system invention, 4) systems research, 5) interior system design and component fabrication, and 6) field test and experimentation.

14, 545

Frazer, J. W. & Reeves, Elizabeth. ADAPTATION TO POSITIVE ACCELERATION. NADC MA 5818, Proj. NM 11 01 12.3, Rep. 4, Dec. 1958, 16pp. USN Air Development Center, Johnsville, Penn.

To determine whether or not animals would show increased tolerance to acceleration (as measured by survival time) if conditioned

to lower levels of acceleration, 150 rats were subjected to acceleration. One group (50) was preconditioned by exposure to 2 g, a second group to 12 g, and third to cage-stressing one-half hour a day for six weeks. At the end of the conditioning period all animals were subjected to 20 g and their survival time was measured by means of a transistor amplifier (heart rate). Statistical correction was made for rats preconditioned at 12 g before comparing survival times for evidences of adaptation. T. G. 1. R 3

14,546

Furchtgott, E. EFFECT OF HUNGER AND SATIETY ON ODOR SENSITIVITY. PROGRESS REPORT. Contract DA 19 129 QM 844, DA Proj. 7 84 15 007, Rep. 9, Aug. 1958, 8pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (University of Tennessee, Knoxville, Tenn.).

Progress is reported on the study of the effects of withheld lunch on gustatory (sucrose) and olfactory (iso-amyl acetate) thresholds for the periods 12:00 to 1:00 p. m. and 4:00 to 5:00 p. m. Data are presented for 136 subjects. T.

14,547

Finnie, A. W. & Kenchington, K. W. L. GLOVES FOR AMMUNITION EXAMINERS. CSEE Rep. 89, Dec. 1958, 33pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

To investigate the use of gloves for the finer manipulative tasks associated with ammunition examination under moderately cold sheltered conditions, a designed trial, in three parts, involving 36 subjects was conducted. The existing Glove, Leather, Light Duty, was examined against the Glove, Chamois, and an experimental glove. Assessments were made by laboratory dexterity tests at 60 and 28 degrees Fahrenheit. Thermal insulation tests were carried out at 28 degrees Fahrenheit. Small scale user trials took place at two Central Ammunition Depots, in which subjects were timed in actual tasks when wearing each type of glove. Subjective assessments were obtained by questionnaire. Recommendations are included. T. G. 1. R 2

14,548

Gallup, H. F. RECEPTOR CONTRIBUTION TO THE CRITICAL FLICKER FREQUENCY CURVE. Rep. NAMC ACEL 341, Aug. 1957, 29pp. USN Air Crew Equipment Lab., Naval Air Material Center, Penn.

To study receptor contributions to the cff (critical flicker frequency) curve, data from previous research were reviewed and their interpretations closely examined. To check certain discrepancies, to fill a gap in the data, to provide an experimental test between predictions from the concept of inhibition of rod effects by cone effects and those from the concept of declining receptor contribution,

and to identify the slopes of rod and cone curves with the size of their respective populations, cff-log intensity curves were determined for two subjects. Light-time fractions (.50, .80, and .90) were used at each of three retinal locations (0, 5, and 18 degrees temporal from fovea) chosen for their different ratios of rods to cones. Forms of the obtained curves are discussed relative to the stated purposes. T. G. 1. R 27

14,549

Gaskill, H. S. SURVEY OF PERSONAL AND INTERPERSONAL FACTORS IN DRIVING. Contract DA 49 007 MD 502, Ann. Rep. for period 1 March 1958 to 28 February 1959, 11pp. USA Research & Development Div., Office of the Surgeon General, Washington, D. C.

This report discusses a research program dealing with the relationship of personal characteristics to motor vehicle accident/violation experiences. During the initial phases (1953-1956), a coordinated series of studies of matched accident-repeater and accident-free airmen drivers demonstrated that specific personality, temperament, and attitude characteristics distinguished these groups more reliably than psychophysiological, intellectual, or skill attributes. Subsequently, a large scale study of 6906 teen-age pre-drivers was initiated to determine whether specific personality factors associated with accident/violation driving could be used to identify subsequent non-safe drivers. A final analysis of the data will be made when these drivers have 36 months driving experience. G. R 3

14,550

Goldsmith, C. T. STATE-OF-THE-ART EVALUATION OF TRANSPARENT PHOSPHOR CATHODE RAY TUBES. Rep. HF 123 59 3.0, Aug. 1959, 12pp. Grumman Aircraft Engineering Corporation, Bethpage, N. Y.

The current state of the art in Evaporated Phosphor Cathode Ray Tubes was investigated with regard to their possible application to high ambient light level display situations. The contrast ratio necessary to produce accurate display viewing was used to determine the brightness requirement for conventional tubes, with and without filtering, and for evaporated phosphor tubes. The possibilities of the latter tubes meeting or surpassing the conventional phosphors are discussed. T. G. R 2

14,551

Gebel, R. K. H. A MILITARY COLOR TELEVISION SYSTEM. Proj. 7072, Task 70827, WADC TN 58 114, April 1958, 8pp.

USAF Aeronautical Research Lab.,
Wright-Patterson AFB, Ohio.

The need for a good practical military color television system is emphasized. A discussion of the technical possibilities and limitations is presented with the more important types of color systems. Emphasis is placed on motion-detection limitation. A superior system for general military application, with or without optical amplification, is described. 1.

14,552

George, L. S. HEAT RESISTANT CLOTHING TRIALS AT THE PARK GATE IRON AND STEEL CO. LTD. SM/A/79/53, Rep. Ref. 53/35, 1953, 4pp. The British Iron & Steel Research Association, London, England.

This report summarizes a demonstration of a heat resistant ensemble worn in the blast furnace and openhearth furnace departments of a steel works. The material of the equipment was composed of aluminum metal adhering to a fire-proofed textile base and consisted of a hood covering the entire head and neck (with glass window), a long-sleeved coat, gauntlets, and leggings with boot top cover. The ensemble was evaluated for degree of protection from heat, fire-proof qualities, durability, and attitude of workers towards wearing it. Recommendations are included. 1.

14,553

Goldman, A. SENSORY INTERACTION AND RESPONSE CAPACITY. Tech. Rep. NAVTRADEVCEEN 789 11 1, June 1959, 52pp. USN Training Device Center, Port Washington, N. Y.

To determine whether the operator in a man-machine system with very high rates can perform more efficiently when the sensory inputs are through one sense modality or divided between two sense modalities, four groups (32 subjects) were required to track a target under one of four conditions. 1) Display was presented visually and was tracked with joystick control. 2) With the same display, a linear control was used with one hand tracking horizontal and the other vertical movements. 3) Horizontal movement of target was displayed visually and vertical movement by audio signal with joystick control. 4) Same as preceding with a linear control. Each group performed three similar, but increasingly difficult tasks. Time-off-target scores were analyzed for effect of the four conditions and task difficulty. T. 1. R 21

14,554

Grubmeyer, R. S. "A NEW LOOK AT REQUIREMENTS FOR ELECTRONIC

SYSTEMS IN AIR TRAFFIC CONTROL". IRE Convention Record, 1956, Part 8, 4pp. (Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.).

This paper reviews the requirements for electronic systems in two areas of air traffic control: display and automatic computing equipment. The problems considered are: 1) a large radar display usable under conditions of ambient lighting suitable for normal reading and writing; 2) practical and economical means for handling multiple input and output requirements of an air traffic control computing system; 3) determination of optimum parameters for a computer to handle conflict search and solution of problems with attention to storage and search requirements; and 4) data processing and computing equipment and techniques satisfying joint requirements of reliability, accuracy, and fail-safe features.

14,555

Hannigan, J. F. FINAL REPORT ON CAMOUFLAGE OF ARMY AIRCRAFT. Proj. 8 31 01 400, Tech. Rep. 1559, Dec. 1958, 82pp. USA Engineer Research and Development Labs., Fort Belvoir, Va.

This report covers those Army aircraft camouflage measures that are appropriate for and compatible with concepts of future warfare in any geographical area. Appropriate camouflage-paint schemes with the minimum logistical burden are prescribed herein for temperate, arctic, desert, and tropical terrain. Details of initial investigations under this project are reported in USAERDL-1508-TR, Interim Report on Camouflage of Army Aircraft. T. G. I. R 17

14,556

Hayes, K. J. WAVE ANALYSES OF TISSUE NOISE AND MUSCLE ACTION POTENTIALS. NM 17 01 13 1, Rep. NAMC ACEL 404, June 1959, 11pp. USN Air Crew Equipment Lab., Naval Air Material Center, Penn.

This report is one in a series concerned with the measurement of stress and its relationship to performance as it may affect the design of information displays and personal safety equipment for the naval aviator. The present report deals with the physical and physiological factors involved in the measurement of muscle action potentials using surface electrodes. Special attention is given to problems associated with minimal muscular activity. This information is intended as a guide for those involved in research using surface electromyography. G. R 5

14,557

14,557

Hawkes, G. R. & Warm, J. S.
COMMUNICATION BY ELECTRICAL
STIMULATION OF THE SKIN II. THE
STIMULUS INTENSITY RANGE. Proj. 6
95 20 001, Task USAMRL T 5, MEDEA,
Rep. 401, Sept. 1959, 15pp. USA Medical
Research Lab., Fort Knox, Ky.

Alternating current was applied to the
finger tip over a broad range of frequencies.
Absolute thresholds for vibration and for
pain, as well as tolerance limits for
alternating-current stimulation were re-
corded. Subjects were able to report
tolerance limits (terminal limen) as reliably
as absolute thresholds for vibration and
pain. No undue emotional reactions were
occasioned by the use of stimulus intensities
up to the tolerance limits of the subjects.
T. G. R 8

14,558

Hertzberg, H. T. E., Dupertuis, C. W.
& Emanuel, I. STEREOPHOTOGRAM-
METRY AS AN ANTHROPOMETRIC
TOOL. Proj. 7214 & Proj. 6333, Task
71728, WADC TR 58 67, Feb. 1958, 6pp.
USAF Aero Medical Lab., Wright-Patterson
AFB, Ohio.

This paper reviews briefly previous
biological applications of stereophoto-
grammetry and outlines with illustrations
the present procedures used to draw human
body contours at one-half inch intervals. It
compares dimensions derived from plotted
profiles with those taken by hand on the sub-
jects themselves. It discusses the utility of
stereo data for special anthropometric pur-
poses and mentions further applications for
other biological sciences. T. G. I. R 11

14,559

Hickey, A. E., Jr. & Blair, W. C.
ENGINEERING CONTROL I. MULTIPLE
DISPLAY MONITORING. Contract NONR
2512(00), P59 004, Electric Boat Tech. Rep.
SPD59 002, Jan. 1959, 14pp. Electric Boat
Division, General Dynamics Corporation,
Groton, Conn.

To determine how operators voluntarily
distribute their visual work load while
monitoring three displays for signals, two
experiments were performed. In one the
signals persisted until they were detected
and reset by the operator; in the other the
signals were transient and were only detected.
In each experiment three groups of six sub-
jects were each given one half-hour session
per day for eight days. Signals were varied
in number for each display but were pre-
sented randomly. Subjects had to push one
set of buttons to light and observe the dis-
plays and another set to report detections
and reset signals. Only one display could
be observed at a time. Both the frequency

and duration of observing were measured
and analyzed. T. G. I. R 4

14,560

Humphries, M. & Shephard, A. H.
AGE AND TRAINING IN THE DEVELOP-
MENT OF A PERCEPTUAL-MOTOR SKILL.
Percept. Mot. Skills, March 1959, 9, 3-11.
(University of Toronto, Toronto, Ontario,
Canada).

This paper is one of a series dealing
with the general problem of the relationship
between chronological age, training, matura-
tion, and performance. In this experiment
three groups of children, ages 5-1/2, 7-1/2,
and 9-1/2 years, received training on the
reversed task of the Toronto Complex
Coordinator in three sessions; each session
was separated by six months. In each ses-
sion, training was given in two five-minute
periods; each period was separated by a 20-
minute rest period. Performance (matches
and errors) was analyzed for relationships
with age. Brief rest periods and intervals
of six months were also examined in relation
to age, amount of training, and age at which
training started. T. G. R 5

14,561

Imus, H. A. RESEARCH IN VISUAL
PHYSIOLOGY. Rep. ONRL 7 52, Jan. 1952,
7pp. USN Office of Naval Research, London,
England.

At the December meeting of the Physi-
ological Society which was held at Bedford
College, Regent's Park, London, on 14-15
December 1951, three papers in visual
physiology were presented. F. C. Rodger,
University of Durham, showed that the in-
tegrity of the visual path can be affected
deleteriously by thiamin deficiency. M. H.
Pirenne and E. G. Denton of Marischal
College, Aberdeen presented two papers.
One was on spatial summation at the absolute
threshold of peripheral vision; the other was
on retinal pigments. R 3

14,562

Jarl, V. C., Gerhardt, R. & Riis, E.
APPROACHES TO THE PROBLEM OF
FLYING SAFETY. 5pp. Norwegian Armed
Forces, Oslo, Norway.

This paper discusses various approaches
to the improvement of flying safety. Present
methods are reviewed critically, especially
the analysis of aircraft accidents. It is
suggested that what constitutes an accident
needs to be redefined. A tentative guide is
presented for facilitating the reporting as
well as the logical and psychological analysis
of predisposing and precipitating factors
leading up to the accident. The gathering
and use of near-accident data is discussed.
It is further suggested that new leads for
research may come from the general care-
of-the-flyer program. An example is given

in the case of lateral dominance as associated with malfunctioning of the pilot. 1.

14, 563

Jerison, H. J. EXPERIMENTS ON VIGILANCE: THE EMPIRICAL MODEL FOR HUMAN VIGILANCE (FIFTH IN A SERIES). Contract AF 33(616) 6095, Proj. 7184, Task 71581, WADC TR 58 526, Jan. 1959, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

A model of human vigilance is presented which is an integrated summary of empirical studies. Vigilance is defined as a probability of detecting rare and near-threshold events (signals). In the model this probability is described as a function of the combined effects of signal frequency, response frequency, signal detectability under ideal observing conditions, time at work, complexity of the monitored display, and various subject variables. A deductive theory of vigilance should have this function as one of its consequences. G. I. R 34

14, 564

Jerison, H. J. EXPERIMENTS ON VIGILANCE: DURATION OF VIGIL AND THE DECREMENT FUNCTION. FOURTH IN A SERIES. Contract AF 33(616) 3404, Proj. 7184, Task 71581, WADC TR 58 369, Dec. 1958, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

Results of previous experiments on vigilance were reanalyzed for data on human performance during short (half-hour) and long (two-hour) vigils. The data permitted performance comparisons of different groups of naive subjects on short and long vigils and of naive subjects on short vigils with that of the same subjects on subsequent longer vigils. The analysis was made in terms of initial and final levels of performance and the shape of the decrement function as affected by length of vigil. An explanation of the findings is offered which is consistent with an expectancy theory of vigilance; implications for lengths of monitoring tasks are discussed. T. G. R 5

14, 565

Johnson, E. P. FLUCTUATIONS IN NIGHT VISUAL ACUITY, SECOND PROGRESS REPORT. Contract DA 49 007 MD 871, Jan. 1959, 10pp. Colby College, Waterville, Me.

This is a report of research in progress which is intended to reveal the character and extent of fluctuations in night visual acuity. Fifty male subjects are being given instructions in the use of the eyes at night and practice in viewing targets at scotopic levels of illumination. Following training each subject undergoes one or

more two-hour periods of testing (making manual adjustive movements in response to visually perceived movement of target) during which the level of visual performance is continuously measured. 1.

14, 566

Karpovich, P. V., Keeney, C. E. & Alexander, A. A. PHYSIOLOGICAL AND KINESIOLOGICAL METHODS FOR TESTING FOOTGEAR. Contract DA 19 129 QM 309, Proj. Ref. 7 79 10 001C, Rep. 13, Jan. 1959, 95pp. USA Textile, Clothing & Footwear Div., QM Research & Engineering Center, Natick, Mass. (Dept. of Physiology, Springfield College, Springfield, Mass.).

To develop physiological and kinesiological methods for the evaluation of the effect of military footwear upon the function of the soldier, several types of American, British, and Canadian footwear were compared. The methods used were 1) measuring energy cost of walking, 2) measuring bone alignment of the foot and lower leg, 3) determining the speed of sprinting 30 yards, the time of running a zig-zag course, and the height of vertical jumping, 4) measuring the pressure exerted on selected areas of the soles of the feet. Several auxiliary devices and techniques were developed. T. G. I.

14, 567

Kennington, K. W. L. THE REGIONAL COOLING OF THE GLOVED HAND UNDER SIMULATED MOTORCYCLING CONDITIONS. Rep. 83, Nov. 1957, 11pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

To minimize bulk in motorcyclist's handwear by the use of graded insulation in accordance with regional requirements, a study was made of hand skin cooling when wearing the Gauntlet, M. T. under simulated motoring conditions. Chamber experiments were carried out at 32 degrees Fahrenheit, in a constant wind of 38 miles per hour, with ten military subjects. Skin temperatures were taken at 12 points on the hand over a period of 30 minutes. Cooling curves were constructed. The results are discussed with reference to hand position when driving and suggestions are made for the design of an improved gauntlet. T. G. I.

14, 568

Kenshalo, D. R. & Nafe, J. P. NEURAL CORRELATES OF THERMAL SENSATION. Contract DA 49 007 MD 683, Prog. Rep. 1, Jan. 1959, 24pp. USA Research and Development Division, Office of the Surgeon General, Washington, D. C. (Florida State University, Tallahassee, Fla.).

This progress report includes data from two articles that have been prepared for publication: "Thresholds of thermal sensation as

a function of the pre-adapting temperatures" and "Low level irradiation and threshold shift in the visual receptor." A third article, dealing with the thermal sensitivity of the cornea, is being prepared and data from this investigation are also included. Future investigations are discussed. G. R 18

14, 569

Kochen, M. & Galanter, E. H. THE ACQUISITION AND UTILIZATION OF INFORMATION IN PROBLEM SOLVING AND THINKING. *Information and Control*, Sept. 1958, 1(3), 267-288. (IBM Research Center, Yorktown Heights, N. Y. & University of Pennsylvania, Philadelphia, Penn.).

Some of the logical consequences of drawing a distinction between the following two aspects of problem solving behavior are explored: 1) actions directed toward the acquisition of information to guide future actions toward valuable goals, and 2) actions directed toward the utilization of accumulated information to attain a valuable goal. An experimental paradigm accomplishing this separation is described for the case of an environment of periodic sequences of binary events. A general way of describing behavioral strategies is developed. The structure of the binary environmental sequences and of the behavioral strategies and their interrelations are described. Predictions from an experiment are compared with data from studies of human subjects. T. I. R 24

14, 570

Law, O. T. & DeValois, R. L. THE USE OF THE OCULAR RESTING POTENTIAL (ORP) AS A MEASURE OF SMALL EYE MOVEMENTS. *Proj. MICHIGAN, Rep. 2144 337 T*, Dec. 1958, 13pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

A bioelectric phenomenon, designated the ocular resting potential (ORP), was utilized to measure small eye movements. The ORP is recorded by placing pairs of electrodes on the skin of the face around the eyeball. This phenomenon depends upon the existence of a polarity difference between the front (cornea) and the back (retina) of the eyeball, the well-known corneal-retinal potential. The success with which the ORP can measure small movements is discussed. An oscilloscope display of complex eye movements as recorded from the ORP is described and its possible uses for research pointed out. G. I. R 25

14, 571

Lennox, Margaret A. STUDY OF THE ORGANIZATION OF THE VISUAL SYSTEM IN RESPECT TO COLOR. *Contract AF 61 (514) 1194, AFOSR TR 59 34*, Dec. 1958, 9pp. USAF Office of Scientific Research, ARDC, Washington, D. C.

A summary of work accomplished during the year 1958 on a study of the

organization of the visual system in respect to color is reported. A correlation of color responsiveness with conduction velocity along the nerve fibers in monkeys was made. Flashes of five different colors at equal intensity were delivered to the eye and the response to single cortical cells recorded. The response of the same cells to stimulation of the optic nerve was then sought. Implications of the results on future work are discussed.

14, 572

Lit, A. DEPTH-DISCRIMINATION THRESHOLDS AS A FUNCTION OF BINOCULAR DIFFERENCES OF RETINAL ILLUMINANCE AT SCOTOPIC AND PHOTOPIC LEVELS. *J. opt. Soc. Amer.* Aug. 1959, 49(8), 746-752 (*Vision Research Labs., University of Michigan, Ann Arbor, Mich.*).

To determine the effects of unequal binocular retinal luminance on the precision of depth discrimination, equidistance (equality) settings were made using a two-rod test apparatus involving real-depth cues by two trained observers. Two variables were studied: 1) the level of equal retinal illuminance presented to the two eyes, and 2) the difference in the level of illuminance presented to the two eyes. Illuminance levels ranged from low scotopic to high photopic levels. The significance of the results for visual theory is discussed. T. G. R 8

14, 573

Lit, A. THE MAGNITUDE OF THE PULFRICH STEREOPHENOMENON AS A FUNCTION OF TARGET VELOCITY. *Proj. MICHIGAN, Rep. 2144 362 T*, Jan. 1959, 15pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

To investigate a localization error that arises when a transversely moving target is binocularly observed under conditions of unequal binocular retinal illumination (Pulfrich stereophenomenon), measurements of the near and far displacements of a black vertical rod were made (two practiced observers) for a wide range of target velocities under each of several conditions of unequal binocular retinal illuminance. The data were analyzed as functions of target velocity for difference levels of difference in binocular illumination. An explanatory theory was offered to account for the results. Implications for problems of military surveillance are pointed out. T. G. I. R 10

14, 574

Ludvig, E. & Miller, J. W. STUDY OF VISUAL ACUITY DURING THE OCULAR PURSUIT OF MOVING TEST OBJECTS. I. INTRODUCTION. *J. opt. Soc. Amer.*, Nov.

1958, 48(11), 799-802. (Kresge Eye Institute, Detroit, Mich. & USN School of Aviation Medicine, Naval Air Station, Fla.).

To determine the manner in which visual acuity is affected when measured during the voluntary ocular pursuit of moving test objects (dynamic visual acuity), apparent movement was produced by rotating a mirror in the desired plane of pursuit. The range of angular velocities utilized was 10 to 170 degrees per second at the nodal point of the tested eye; the test objects were Landolt rings. Dynamic visual acuity thresholds were determined for enlisted naval personnel ranging in age from 17 to 33 years having a static visual acuity of 20/20 or better. The acuity data were analyzed as a function of velocity. Possible causes for the findings are discussed. T. G. I. R 13

14, 575

Martindale, R. L. & Lowe, W. F. USE OF TELEVISION FOR REMOTE CONTROL: A PRELIMINARY STUDY. Proj. 1811, AFSWC TN 58 12, Aug. 1958, 10pp. USAF Special Weapons Center, Kirtland AFB, N. M.

Closed circuit television is expected to have a variety of military applications requiring remote control. This test was performed to determine optimum monitoring arrangements. Fifteen Air Force officers performed a simple remote control task under five monitoring conditions and the accuracy of their performance was measured. The data were analyzed for effects of displacement of the visual field from normal line of sight and for different camera positions. Some remedial actions were discussed such as repositioning the monitor to compensate for camera angle. T. R 1

14, 576

McDowell, A. A. & Brown, W. L. SOME EFFECTS OF NUCLEAR RADIATION EXPOSURE ON THE BEHAVIOR OF THE RHESUS MONKEY. Rep. 58 58, April 1958, 4pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas, Austin, Tex.).

To determine the effects of nuclear radiation exposure on the behavior of the monkey, ten male rhesus monkeys were exposed to nuclear radiation. Systematic observations of the free cage behavior of the experimental and nine control (non-exposed) animals were made for ten days preceding and on alternate days for as long as he survived through 28 days following exposure. The four behavioral categories were 1) nondirected visual activity, 2) nondirected locomotor activity, 3) object-directed activity, and 4) self-directed activity. The behavioral syndrome was compared to that known to be produced by laboratory exposure to radiation. G. R 5

14, 577

Meeker, W. F. ACTIVE EAR DEFENDER SYSTEMS: COMPONENT CONSIDERATIONS AND THEORY. Contract AF 33(616) 3051, Proj. 7210, Task 71700, WADC TR 57 368(Part I), Sept. 1958, 86pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Radio Corporation of America, Camden, N. J.).

The potentialities of the noise canceling principle to improve ear protectors were investigated. The basic theory, discussed in an appendix, was applied to 1) a non-feedback cavity ear muff system, wherein noise picked up by a microphone outside the muff and adjusted for phase and amplitude was transmitted through earphones under the muff, 2) a feedback ear muff system, similar to the first, yet employing negative feedback with the pickup microphone located inside the muff, and 3) a freefield loudspeaker system. Based upon the examples studied and the transducer problems involved, objectives for developmental noise reducing systems are suggested. T. G. I. R 12

14, 578

Schmitz, M. A. THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VERTICAL VIBRATION ON HUMAN PERFORMANCE. PROGRESS REPORT NO. 2A JANUARY 31, 1958 TO JANUARY 31, 1959. Contract DA 49 007 MD 797, Rep. 128, Jan. 1959, 58pp. Bostrom Research Laboratories, Milwaukee, Wisc.

To determine whether relatively low frequency and high amplitude vertical vibration (of the type found in work vehicles) affects human psychomotor performance, 18 subjects were exposed to vibrations of 2.5 and 3.5 cps at two displacements for 90 minute periods. Subjects were seated on a wooden chair on a mechanical shaketable. Pre- and post-control measures were taken before and after each test session. Performance during vibration was compared to a no-vibration condition on the following tests: 1) hand tremor, 2) visual acuity, 3) compensatory tracking, 4) foot pressure constancy, 5) foot reaction time, and 6) body equilibrium. The effects of exposure time and vibration conditions were analyzed. T. G. I. R 25

14, 579

Schweigert, B. S. & Doty, D. M. CHEMISTRY OF COLOR, FLAVOR AND ODOR CHANGES IN IRRADIATING MEAT. FINAL REPORT. Contract DA 19 129 QM 512, Proj. 7 84 01 002, File S 507, Rep. 13, June 1958, 113pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (American Meat Institute Foundation, Chicago, Ill.).

This is a final report on studies concerned with reactions of meat and meat products which take place during ionizing radiation: odor, flavor, and color changes. The bulk of the work reported here used beef for investigation purposes. Chemical changes that occur in irradiated meat are reported along with the methods developed for determining the changes. Effects of aging and storing on chemical changes are also reported. T. G. R 49

14, 580

Shultz, G. L. THE USE OF THE IBM 704 IN THE SIMULATION OF SPEECH RECOGNITION SYSTEMS. Res. Rep. RC 37, Dec. 1957, 20pp. International Business Machines Corporation, Poughkeepsie, N. Y.

The first step in mechanical speech recognition involves the analysis of a large number of speech sounds to determine the characteristics by which these sounds may best be discriminated. To accomplish this analysis special advantage is taken of techniques made possible by the advent of the large scale digital computer. This paper describes the equipment required to both facilitate editing samples of sounds for analysis and convert these sounds to digital form suitable as computer inputs. A system of programs is presented and the feasibility of the computer as a research tool is illustrated.

14, 581

Silvestro, A. W., Kelly, J. B. & Courtney, D. HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF AIRPORT TRAFFIC CONTROL QUARTERS (SECOND INTERIM REPORT) PRELIMINARY ENGINEERING LAYOUTS. Contract FAA/BRD 89, Proj. P, Rep. 27, June 1959, 39pp. Courtney and Company, Philadelphia, Penn.

This report contains recommendations and drawings for the design of air traffic control quarters in which human factors considerations are of prime interest. A modular design is basic to all recommendations. Section I is concerned with the general layout of the tower building and Section II with airport traffic control quarters: tower cab level, cab access level, equipment room level, Instrument Flight Regulations room level, controller ready room level, training room level, and administrative level. I. R 1

14, 582

Sinaiko, H. W. & Cartwright, G. P. CAREFUL: A PILOT STUDY OF THE EFFECTS OF HEAVY TARGET LOAD ON HUMAN AND AUTOMATIC DECISION MAKERS. Contract DA 36 039 SC 56695, D/A Subtask 3 99 01 002, Rep. R 115, Sept. 1959, 43pp. Coordinated Science Lab., University of Illinois, Urbana, Ill.

A brief experiment was done to test the hypothesis that very heavy target loads would adversely affect a human tactical decision-maker while the same number of targets would not degrade the performance of an automatic system. A series of air defense exercises was used in three modes: 1) fully automatic, 2) C1C officer could override decisions of the automatic system or make his own if he so chose, and 3) the officer made all the decisions and assignment of interceptors. Two scripts differing in numbers of targets (37 and 60) were used. Data (target penetrations, kills, assignments) from 24 runs were analyzed in terms of the effectiveness of the mode under each load condition. Implications of the findings for designers of automatic decision-making machines are discussed. T. G. I. R 7

14, 583

Sleight, R. B., Cook, K. G. & Beazley, R. M. DESIGN STANDARDS FOR MAN-MACHINE TASKS IN SIGNAL CORPS SYSTEMS. FIRST QUARTERLY PROGRESS REPORT 1 JUNE 1959 - 1 SEPTEMBER 1959. Contract DA 36 039 SC 78328, DA Proj. 399 00 110, Sept. 1959, 38pp. Applied Psychology Corporation, Arlington, Va.

The results of the first work performed in specifying design standards for man-machine tasks are presented. Initial work consists of 1) interviews with persons having extensive experience and knowledge of Signal Corps equipment on the subject of the human functions utilized in the present equipment; 2) observations of equipment in operation; 3) the development of a list of human functions in Signal Corps man-machine operations; and 4) a search for basic terms. Future stages of the work are discussed. T. 1.

14, 584

Snyder, J. F. DIVE REACTION SCALE STUDY. Proj. NS185 005, Subtask 5, Test 10, Res. Rep. 5 58, March 1958, 12pp. USN Experimental Diving Unit, Naval Gun Factory, Washington, D. C.

To develop a scale for measuring symptoms of decompression sickness which will improve the precision of experimental work in diving, a sample of 60 cases covering a wide range of seriousness in post-dive symptoms was selected. Six judges, medical officers with considerable experience in experimental diving, ranked and scored the cases in terms of seriousness. The responses were examined for agreement of judgments. Ratings and scores were analyzed and, together with descriptive judgments, used as a basis for a zero-ten psychometric scale. T. G.

14, 585

Tanner, W. P., Jr. A RE-EVALUATION OF WEBER'S LAW AS APPLIED TO PURE TONES. Contract DA 36 039 SC 63203, DA Proj. 3 99 04 042, SC Proj. 194B, Rep. 2262 185 T, Tech. Rep. 55, Aug. 1958, 26pp. Dept. of Electrical Engineering, University of Michigan Research Institute, Ann Arbor, Mich.

The hypothesis that Weber's law as applied to intensity discrimination of pure tones reflects a condition of the environment rather than the hearing mechanism was investigated. An inventory of the various possible noise sources which may exist was made and an equation derived for the way in which these noise sources may be expected to affect the detectability of a signal. Data for three observers over four levels were obtained and analyzed in terms of the equation. G. I. R 4

14, 586

Tanner, W. P. Jr. & Jones, R. C. THE IDEAL SENSOR SYSTEM AS APPROACHED THROUGH STATISTICAL DECISION THEORY AND THE THEORY OF SIGNAL DETECTABILITY. 1959, 19pp. University of Michigan Research Institute, Ann Arbor, Mich. & Polaroid Corporation, Cambridge, Mass.

An analysis is presented of sensory experiments in which the relevant variables are identified and those conditions in the environment are analyzed which place limits on performance in visual experiments. A general model of an ideal observer, one who performs to the limits of his environment, is described. The model is a purely mathematical concept describing the maximum possible correlation between observable events in very simple detection experiments. The analysis of the limits of environment is based on the statistical properties of photons. Necessary terms are defined, and a theorem for employing the model in descriptive ways is presented and illustrated. G. I. R 10

14, 587

Taylor, F. V. THE HUMAN AS AN ENGINEERING COMPONENT. A. M. A. Arch. industr. 11th., March 1959, 19, 278-282. (USN Research Lab., Washington, D. C.).

It is argued that, in designing man-operated machines, it is useful to consider the man as an engineering component, to determine his system-relevant properties, and to take as many as possible of these into account in structuring the mechanical portions of the system. The use of the human engineering principle of quickening is given to demonstrate the argument. I. R 5

14, 588

Klein, R. M., Twyford, L. C., O'Hara, J. G. & Goldman, A. GREEN LIGHT RATER. Tech. Rep. NAVTRADEVEN 20 OS 3 1, Dec. 1958, 5pp. USN Training Device Center, Port Washington, N. Y.

The Green Light Rater is a teach-test device designed to provide teaching and practice to supplement more formal classroom instruction. The human engineering requirements for such a device are discussed. The validity of the Green Light Rater is presented in terms of the psychological principles of learning embodied and of a field evaluation. A brief description is included. I. R 1

14, 589

Case Institute of Technology. COMMUNICATIONS IN THE PRESENCE OF AN INTELLIGENT NOISE SOURCE. Contract AF 30/602, 1847, Tech. Note 2, Jan. 1959, 20pp. Operations Research Group, Case Institute of Technology, Cleveland, Ohio.

This note develops the analysis of three models of a communicator and jammer situation that were previously discussed in note Number One (see 5196). A new model is also described, based on a game theoretic view of communication. T. G.

14, 590

USN Aviation Safety Center. INTERIM REPORT OF EJECTIONS FOR PERIOD OF 1 JANUARY TO 30 JUNE 1958. June 1958, 12pp. USN Aviation Safety Center, Naval Air Station, Va.

Ejections from U. S. Navy aircraft for the period 1 January to 30 June 1958 are reported in tabular and graphic form. The data are analyzed as to ejection rate per 10,000 hours, fatality rate per 10,000 hours, altitude effects, speed effects, attitude effects, and injuries. There is no discussion. T. G.

14, 591

Van Horn, W. H. PROTECTION OF ENGINEER HEAVY EQUIPMENT OPERATORS IN RADIOLOGICALLY CONTAMINATED AREAS. Subproj. 8 12 95 400, Tech. Rep. 1565, Feb. 1959, 58pp. USA Engineer Research & Development Labs., Fort Belvoir, Va.

This report covers engineering tests made to determine the shielding characteristics of standard and developmental engineer heavy equipment (items that could be used for decontamination work) and to ascertain methods for increasing the inherent shielding. Lead shielding for the cab was designed and a prototype lead cab was field tested in radiologically contaminated areas. T. G. I. R 4

14, 592

Kochen, M. A MATHEMATICAL FORMULATION OF INFLUENCE DISTRIBUTIONS IN DECISION-MAKING GROUPS. J. Soc. Indust. Appl. Math., Sept. 1958, 6(3), 199-208.

This article represents a mathematical approach to the description of distributions of influence which is unrelated to game theory.

The results obtained provide means of studying the structure of groups with respect to the influence upon decision making that the voters exert upon each other. R 5

14, 593

Milne, G. G. & Eyer, J. A. THE PROBLEM OF ACHIEVING IMPROVED SPECTRAL PHOTOMETRY. FINAL REPORT. Contract NONR 1799(10), Dec. 1958, 27pp. Institute of Optics, University of Rochester, Rochester, N. Y.

The performance of a spectrograph employing a photographic emulsion as image receptor can be described in terms of threshold sensitivity, or of the amount of exposure required to record a definite amount of information, or of the total information which the system can record. The effects of developer choice upon these various measures of system performance are examined for a particular emulsion. The results of changing development conditions are also examined briefly. The usefulness of the philosophy employed for comparing the effectiveness of various spectrographic systems when used to make photometric measurements is pointed out. T. G. R 5

14, 594

Moller, F. D. HIGH ALTITUDE, PARTIAL PRESSURE SUITS DESIGNED WITH DOUBLE CAPSTANS, VENTILATION LAYERS, AND PARTIAL PRESSURE AND FULL PRESSURE SOCKS. Contract AF 33 (616) 3904, Proj. 6336, Task 63619, WADC TR 59 246, June 1959, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (The Berger Brothers Company, New Haven, Conn.).

This report deals with the resizing of the Type MC-4 suit (partial pressure, high altitude, with g-bladder protection) to meet fitting requirements when selection is made by "Stature-Weight" selection charts. The resized suit is known as Type MC-4A. The design and construction of three prototypes of partial pressure suits having various features in them requiring evaluation are discussed. The development of pneumatic socks (both partial pressure and full pressure) for pressurizing the feet is also discussed. T. 1.

14, 595

Morris, A. & Hood, J. M., VISIBILITY OF SIGNAL FLAGS. NEL/Rep. 864, Oct. 1958, 10pp. USN Electronics Lab., San Diego, Calif.

To provide information as to visibility ranges of standard signal flags as seen by the eye and through standard optical devices under various atmospheric conditions, a study was undertaken consisting of two phases: 1) a field survey of ships operating in the San Diego area to determine facts

about operational uses of flags and optical devices aboard the various ships, and 2) a pilot study to measure ranges of a few sample flags observed under one atmospheric condition, with the unaided eye and one typical optical aid (binoculars). Recommendations are included. 1.

14, 596

Murnin, J. A. THE DEVELOPMENT AND EVALUATION OF A LOW-COST CLOSED-CIRCUIT INSTRUCTIONAL TELEVISION SYSTEM: THE ONE-CAMERA TELEVISION CHAIN. Contract N61339-22, Tech. Rep. NAVTRADEVCE 5 11 1, Dec. 1958, 90pp. USN Training Device Center, Port Washington, N. Y. (Pennsylvania State University, State College, Penn.).

To develop and evaluate a low-cost closed-circuit educational television system for use in mass military training, a low-cost television originating and receiving system that required minimal training for its operation and minimal maintenance was assembled from "off-the-shelf" components. The system was installed at Naval Training Center, Bainbridge, Maryland, and techniques were developed for presenting instructional materials for Indoctrination Curriculum. Instruction was given to recruits over a three-month period and the program was evaluated in terms of growth, learning, and personal attitudes toward televised instruction. 1. R 2

14, 597

Peckham, R. H. & Hart, W. M. RETINAL SENSITIVITY DURING PHOTOPIC ADAPTATION. Contract NONR 2750(00), Tech. Rep. 1, Oct. 1959, 18pp. The Eye Research Foundation, Bethesda, Md.

To investigate factors that may affect the response of the eye to sudden changes in luminance, a psychometric method was employed. This entails determining the probability of response of each subject to a series of stimuli in a liminal range, presented in an order that appears random to the subject. The stimuli were repetitive short alternations of equal durations above and below a constant background luminance. The response was called "scintillation." A series of eight experiments was performed on 1) effect of contrast and range, 2) summation, 3) reliability of data, 4) retinal sensitivity to low luminance, 5) effect of adaptation to excessive brightness and to dimness, and 6) effect of age. T. G. 1. R 8

14, 598

Peters, G. A. & Hussman, T. A. HUMAN FACTORS IN SYSTEMS RELIABILITY. Human Factors. April 1959, 1(2), 38-42. (Psychological Research Associates, Inc., Encino, Calif.).

A general introduction is given to the basic concepts involved in engineering for

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14,604

systems reliability. The problems of performing human factors research that will be of maximum usefulness to those doing engineering design and management decisions regarding the human element in systems reliability are discussed. The need for specifying task variables in quantitative units that are compatible with other engineering formulations is stressed. It is urged that greater emphasis be placed on operational analysis under realistic environmental conditions. An idealized methodological approach to human factors research is described. R 3

14,599

Raichlen, F. PERSONAL PROTECTIVE EQUIPMENT FOR MISSILE ROCKET FUEL HANDLERS. APGC Proj. 976HS01, APGC TN 59 8, March 1959, 20pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

This report resulted from studies made in conjunction with an analysis of the environmental health hazards associated with the RASCAL and BOMARC missiles. Discussions of the personal protective clothing used by the handlers of these missiles and of new developments by the Air Force and Army in protective clothing are included. The adequacy of protection against the toxic chemicals is pointed out in contrast to the degree of discomfort in the clothing. Since the amount of precaution used by the handler is felt to be highly related to comfort, recommendations are made for certain features necessary for this type of clothing. Three different types of clothing sets are recommended, each designed for a specific type of operation. I.

14,600

Riggs, L. A., Krauskopf, J. & Chapman, R. PROGRESS REPORT ON SPECTRAL SENSITIVITY OF SMALL RETINAL AREAS. JULY 1958 TO MARCH 1959. Contract DA 49 007 MD 979, 7pp. Brown University, Providence, R.I.

Progress on a series of experiments is reported. 1) Single unit potentials were recorded from the bull frog retina with micro-electrodes. Techniques for isolating and identifying single unit responses are described. The primary concern was with variations in the response of these units with stimuli of varying wavelength. Film records are now being analyzed. 2) The effectiveness of very small spots of monochromatic light on the human eye is being explored by measurement of the increment thresholds for monochromatic light and the calculation of spectral sensitivity curves for repeated stimulation of the same area. Further experiments are described.

14,601

Rockway, M.R. & Franks, P.E. EFFECTS OF VARIATIONS IN CONTROL BACKLASH AND GAIN ON TRACKING PERFORMANCE. Proj. 7197, Task 71635, WADC TR 58 553, Jan. 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report is one of a series concerned with the effects of discontinuous control system nonlinearities on tracking performance. Six subjects performed a simulated aircraft tracking task using each of 12 control conditions resulting from combining four levels of control backlash (0, 0.2, 0.6, and 1.8 degrees of stick deflection in total extent) and three levels of gain (0.5:1, 1.5:1, and 5.0:1). Integrated error scores and a limited number of graphic records of display error and control position were obtained. The error scores were subjected to analysis of variance for effects of backlash, gain, and their interactions on system performance. The implications for design of manual control systems were discussed briefly. T. G. I. R 7

14,603

Lakeside Laboratories, Inc. CATRON HCI INVESTIGATOR'S BROCHURE. April 1959, 31pp. Lakeside Laboratories, Inc., Milwaukee, Wisc.

This investigator's brochure is concerned with an experimental drug, CATRON (β -phenylisopropylhydrazine), that has been found to be a potent enzyme monoamine oxidase (MAO) inhibitor with marked selectivity for brain tissue at dosage levels having little or no effect on the liver. Its effect in raising the levels of brain serotonin and norepinephrine has been the subject of extensive biochemical and pharmacological investigations. Clinical studies in the treatment of depressions, behavior and emotional problems of children, hypertension, angina pectoris, and rheumatoid arthritis have been conducted. T. G. R 62

14,604

USN Group Psychology Branch. BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS IN GROUP PSYCHOLOGY. Rep. ACR 22, Sept. 1957, 41pp. USN Group Psychology Branch, ONR, Washington, D.C.

This bibliography lists technical reports submitted to the Office of Naval Research in the field of group psychology as of 1 January 1957. The primary areas covered are: 1) the structure and function of the group as a whole, 2) the behavior of the individual as a group member, 3) and a combination of (1) and (2) with emphasis on motivation. Other reports concern: disturbed psychological states which are of interest to the Navy; psychological warfare; and fatigue and related states. R 700 (approx.)

14,605

Chapanis, A. (Dir.). A REPORT OF RESEARCH UNDER CONTRACT WITH THE OFFICE OF NAVAL RESEARCH. PROGRESS REPORT NO. 2, 1 NOVEMBER 1959. Contract (NONR) 248(55), Nov. 1959, 14pp. Institute for Cooperative Research, Johns Hopkins University, Baltimore, Md.

This report outlines progress on a general research contract concerning psychophysiological aspects of sensory perception and discrimination relating to design characteristics, human utilization and evaluation of man-machine systems. A list of the personnel and their visits and special activities is given; the research reports published since the last report (four) and those awaiting publication (three) are listed; summaries are given for reports completed since the last report (four); and current and proposed research projects (twelve) are described. A bibliography of reports (twelve) published in the last two years is included. R 19

14,606

Jones, M. B. & Goodson, J. E. THE EFFECT OF BOREDOM ON SUGGESTIBILITY. Proj. NM 16 01 11, Subtask 16, Rep. 1, July 1959, 10pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To investigate the relationships between suggestibility and boredom, two groups of naval aviation cadets were deprived of all social contact for a period approximating eight hours. Immediately following isolation the cadets were tested individually for suggestibility, and an equal number of control subjects were also tested. The Hull body-sway technique was used to test for suggestion of postural sway and of arm levitation. Responses of the two groups were compared. T. R 12

14,607

Crook, M. N., Gray, Florence E., Hanson, J. A. & Weisz, A. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: FAMILIAR FORMS VIEWED AGAINST COMPLEX BACKGROUNDS IN FACSIMILE COPY. Contract DA 49 007 MD 536, Interim Rep. 3, May 1955, 9pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

To measure the effect of noise degradation on recognizability of form as seen against several types of background, test forms from an earlier experiment were grouped into four difficulty categories. The background arrangements were referred to as 1) plain, 2) ten percent small, 3) 20 percent small, and 4) 20 percent large. Each combination of forms and backgrounds was presented at four signal/noise levels. Subjects wrote on prepared record sheets the names of the

forms they thought they could identify. Recognition scores were analyzed for recognition-noise functions for the several types of background. G. I.

14,608

Boardman, L. J. SOME CHARACTERISTICS OF THE EYE AFFECTING PHOTOMETRIC MEASUREMENTS. NRL Rep. 5296, May 1959, 19pp. USN Research Lab., Washington, D. C.

A series of measurements were made to determine how some of the luminosity characteristics of the eye change in the mesopic and scotopic regions of vision and how these changes affect photometric measurements. Two interdependent studies were made. 1) The variation of achromatic sensitivity over the retina of a fully dark-adapted eye was measured using five observers (for the temporal side), level of illuminance 2.1 effective microlamberts, and angular distances ranging from two to sixty degrees from foveal center. Measurements were extended on one subject for the nasal region, for luminances up to 30 effective microlamberts, and for various colors. 2) The effect of equivalent luminance due to size, shape, and color of the photometric field was measured on five subjects. T. G. I. R 6

14,609

Bryan, G. L., Rigney, J. W., Bond, N. A., Jr., LaPorte, H. R., Jr., et al. THE ROLE OF HUMANS IN COMPLEX COMPUTER SYSTEMS: A DESCRIPTION OF THE STUDY. Contract NONR 228(02), Proj. NR 153-093, Tech. Rep. 24, Jan. 1959, 57pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

The background, rationale, and procedures used to study personnel problems connected with programming and maintaining general purpose digital computers are described. Fifty computer locations were visited, and interview, observational, and questionnaire data were collected. Brief descriptions of the various data-collection techniques are given. This report is the first of a series of four; substantive findings will be presented in following reports. T. I. R 4

14,610

Baker, C. A., Morris, D. F. & Steedman, W. C. TARGET RECOGNITION ON COMPLEX DISPLAYS. Proj. 7184, Task 71580, WADC TR 59 418, Aug. 1959, 21pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

To determine the speed and accuracy of form recognition in a search task similar to that in air-to-ground radar and infra-red sensing systems, subjects (24) were first shown a reference photograph of a target and instructed to locate that target on a display

IV 197

containing numerous other forms. The stimulus forms were generated by filling in, on a statistical basis, some of the cells of a 90,000-cell matrix. Variables were: 1) four degrees of distortion between reference form and target, 2) four sizes of display with proportional increase in number of irrelevant forms, and 3) the stimulus properties of the forms (single cell or group of interconnected cells). Criterion measures (search time and errors) were analyzed for effect of these variables. T. G. I. R 4

14,611

Baker, C. H. THREE MINOR STUDIES OF VIGILANCE. PCC Proj. D77 94 20 42, DRML Proj. 234, Rep. 234-2, H. R. 178, April 1959, 15pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

The three experiments reported were undertaken to test inferences made from an expectancy theory of vigilance. The first demonstrates the expectancy concept in a reaction time experiment. The second was undertaken to examine the hypothesis that vigilance decrement is a function of inter-signal regularity. The third investigates the way in which knowledge of results operates in a vigilance setting. An appended note presents data on the ability of human subjects to generate a series of signals characterized by temporal regularity. T. G. R 11

14,612

Arens, Beverly E. & David, H. A. OPTIMAL SPACING IN REGRESSION ANALYSIS (PRELIMINARY REPORT). ca. 1958, 31pp. Virginia Polytechnic Institute, Blacksburg, Va.

Experimenters frequently measure a response (or dependent) variable y for a set of values of an independent variable x . In this analysis, the assumption is made that x can be measured without error but that y possibly differs from its unknown true value $f(x)$ by a random term z which may represent experimental error, individual random departure from the true law or both. Polynomial approximations to $f(x)$ provide a convenient approach to these problems. The situation in which the levels of x are at the choice of the experimenter is dealt with in terms of how the n values of x should be spaced in order to minimize the error of the approximating polynomial. Cases of negligible random error and a straight-line approximating function are considered. (See also 14,615). T. G. R 4

14,613

David Clark Co., Inc., Worcester, Mass. INTEGRATION OF PERSONAL EQUIPMENT. Contract AF 33(616) 3329, Proj. 6325, WADC TR 59 382, Aug. 1959, 28pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report covers the efforts, methods of approach, and solutions to some of the problems of integrating items of aircrew personal equipment. The major problem of integration is the combining of various individual items that have specific functions with each other without complicating these combinations beyond their effective limits. Practical solutions were achieved in some areas, but additional work is required in others. I. 14,614

Graham, C. H. & Hsia, Y. SOME VISUAL FUNCTIONS OF A UNILATERALLY DICHROMATIC SUBJECT. Proceedings of a Symposium held at the National Physical Laboratory on Sept. 23, 24 & 25, 1957, Paper 11, 280-295. National Physical Laboratory, London, England.

This paper presents a report on the visual functions of a subject giving color blind discriminations with the left eye and normal discriminations with the right eye. Luminosity curves, flicker curves, brightness matches, color-mixture data, hue discrimination data, and binocular color matching data are presented and discussed. The implications of the findings for visual theory are indicated. G. R 13

14,615

David, H. A. & Arens, Beverly E. OPTIMAL SPACING IN REGRESSION ANALYSIS. ca 1958, 13pp. Virginia Polytechnic Institute, Blacksburg, Va.

This report is the final version of a study of optimal spacing in regression analysis. See abstract for 14,612. T. G. R 6

14,616

Case Institute of Technology. COMMUNICATIONS IN THE PRESENCE OF AN INTELLIGENT NOISE SOURCE. Contract AF 30/602/ 1847, RADC TN 59 68, Tech. Note 3, 1959, 9pp. Operations Research Group, Engng. Administration Dept., Case Institute of Technology, Cleveland, Ohio.

Strategies for a communicator to use during interference by an enemy jammer have been discussed in previous notes. The objective of these strategies was to enable the communicator to maximize either his average unjammed message time or his average channel capacity. This note discusses a system of coding to be used for keeping errors within reasonable bounds when the receiver and transmitter cannot know at which points in time they are communicating without interference. The suggested system is not considered to be optimal but is an improvement over mere repetition.

14,617

Parker, J. F., Jr. A REPORT ON RESEARCH CONCERNING A METHOD FOR OPTIMIZING THE EFFICIENCY OF TRAINING PROGRAMS. ANNUAL REPORT. Contract NONR 2489(00), Dec. 1958, 13pp.

14,618

Psychological Research Associates, Inc.,
Arlington, Va.

This note describes the basic nature of a research plan that aims to determine the extent to which effectiveness of training can be increased by using instructional procedures based on the changing patterns of ability which have been found to underlie each proficiency stage of learning. A tracking task is to be used. The plan of procedure, performance measures, and the training program are outlined and discussed. G. R 1

14,618

Peres, S. H. IMPLICATIONS OF RANGER TRAINING FOR FIGHTER PREDICTION. Proj. 29560000, Comb Sel b-02, Tech. Rep. 116, Oct. 1959, 39pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D. C.

To continue current research efforts to identify men with fighter potential, a field situation is needed in which combat trainees can demonstrate their tactical competence in the face of combat-like pressures. The rigorous Ranger Training course of the US Army Infantry School provides a close approximation to the type of field situation desired. As a first step in translating Ranger activities into situations where the individual's competence might be assessed, a civilian research psychologist enrolled in the eight-week Ranger training course. On the basis of his records and observations a preliminary blueprint of patrol-patterned situations was drawn up and is presented herein. 1.

14,619

Neely, K. K. & House, P. W. THE INTELLIGIBILITY OF VERBAL SYMBOLS: II. TWO-, THREE-, AND FOUR-WORD PHRASES OF VERBAL COLOUR SYMBOLS. PCC Proj. D77 94 40 07, DRML Proj. 118, Rep. 118-3, March 1959, 18pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

To evaluate the effects of adverse noise conditions (-12 decibels signal-to-noise ratio) on the intelligibility of 26 verbal color symbols used in radiotelephony, test lists were recorded in which each word appeared twice in each position of a two-, three-, and four-word phrase. Trained listeners (69) responded to the recorded test lists by writing down the word they heard. The data were analyzed for differences in intelligibility among the symbols, for differences with respect to position in the phrase, and for differences due to the use or omission of a carrier phrase. T. R 5

14,620

Miller, E. F., II. EFFECT OF EXPOSURE TIME UPON THE ABILITY TO PERCEIVE A MOVING TARGET. Proj. NM 17 01 11, Subtask 2, Rep. 2, Jan. 1959,

11pp. USN School of Aviation Medicine,
Naval Air Station, Fla.

To determine the effect of duration of observation upon the ability to perceive a moving target, 66 naval aviation cadets were tested on a target moving at 110 degrees/second angular velocity. Seven exposure times were used: 200, 300, 400, 500, 600, 660, and 820 milliseconds; the moving targets were Landolt rings. Threshold measurements were made for each exposure time by reducing the size of the ring until a point was reached when 50 percent correct judgments of the position of the opening were made after each target excursion. Individual differences are discussed. T. G. R 6

14,621

Green, B. F. Jr. (Leader). PSYCHOLOGY GROUP 58 QUARTERLY PROGRESS REPORT. Contract AF 19(604) 5200, Rep. 58 8 1, Sept. 1959, 9pp. Lincoln Lab., Massachusetts Institute of Technology, Lexington, Mass.

This is a report of work accomplished or in progress on a research program in psychology. The major program is aimed at the development of more effective means for men to communicate with machines. Five aspects are being developed: automatic speech recognition, syllable segmentation, speech synthesis, information processing language, and information retrieval. Human information processing such as auditory encoding, visual psychophysics, prediction of complex judgments, remembering and rote learning are also under investigation. Several methodological problems are discussed. G. R 6

14,622

Loeb, M. & Riopelle, A. J. THE INFLUENCE OF LOUD CONTRALATERAL STIMULATION ON THE THRESHOLD FOR LOWER FREQUENCY TONES. Proj. 6 95 20 001, Task 01, Rep. 404, Nov. 1959, 11pp. USA Medical Research Lab., Fort Knox, Ky.

To measure the attenuation due to the acoustic reflex for sounds near threshold, two experiments were performed using different psychophysical procedures. In the first, subjects tracked the threshold for 100, 500, and 1000 cps tones continuously by a procedure similar to Bekesy audiometry; in the second, thresholds were determined by the method of limits for brief 125, 500, and 1000 cps test tones. In both experiments a contralateral tone (100 decibel, 2000 cps or 105 decibel, 2200 cps) was introduced to activate a reflex and the resultant shift for a test tone was noted. Possible significance of the results is discussed. T. G. I. R 8

14,623

Schutz, H. G., Overbeck, R. C. & Laymon, R. S. RELATIONSHIP BETWEEN

IV 199

14,628

FLAVOR AND PHYSICO-CHEMICAL PROPERTIES OF COMPOUNDS. FINAL REPORT. Contract DA19 129 QM 1141, Proj. 7 84 15 007, P 1115, Rep. 3, Oct. 1958, 40pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (Battelle Memorial Institute, Columbus, Ohio).

Work is reported on the following: 1) an experiment on adaptation and cross-adaptation in which ten subjects rated the intensity of 30 diverse odorants (on a nine-point scale) at supra-threshold levels for a ten-minute period, at which time they rated a second odorant to yield cross-adaptation information; 2) physico-chemical data collection on the 30 odorants; 3) computation of rank-order correlations among the physico-chemical variables, the nine factors obtained in a factor analysis of the 30 odorants in a previous study, rate of adaptation, and intensity; 4) a discussion and interpretation of the results in light of current olfactory theory and recent experimental evidence. T. G. R 21

14,624

Karasik, B. S. & Zucker, F. J. (Eds.). THE MCGILL SYMPOSIUM ON MICROWAVE OPTICS PART II DIFFRACTION AND SCATTERING. AFCRC TR 59 118(II), April 1959, 369pp. USAF Electronics Research Directorate, AFCRC, Bedford, Mass.

This volume presents 39 papers dealing with various problems in diffraction theory. The objective of the symposium at which they were presented was to make an appraisal of the status of the field and indicate future lines of work. Some of the major topics dealt with are: electromagnetic theory, general techniques, the geometric optics limit, asymptotic developments, diffraction by apertures, scattering by specific bodies, radiation patterns by antennas, and experimental studies. T. G. 1. R 175 (approx.)

14,625

Kopra, L. L., Pedrini, D. T. & Fullington, R. W. DAY-TO-DAY STABILITY OF THE AUDITORY THRESHOLD IN NOISE-EXPOSED AND NON-NOISE-EXPOSED AIR FORCE PERSONNEL. Rep. 59 85, Aug. 1959, 10pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

To investigate short-term cumulative temporary threshold shift in noise-exposed Air Force personnel, daily pure-tone audiometric tests were administered on five consecutive mornings to three groups of men: 1) 27 flight-line men exposed to job noise, 2) 24 flight-line men not exposed to job noise during the test week, and 3) 52 non-flight men. The audiometric data were analyzed for day-to-day variability and for changes occurring during the test week. T. G. R 8

14,626

Kraus, R. N. DISORIENTATION: AN EVALUATION OF THE ETIOLOGIC FACTORS. Rep. 59 90, Aug. 1959, 8pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

A brief history of the development of instrument flight and a review of the physiologic mechanisms involved in maintaining aerial orientation were presented. To investigate the hypothesis that anything requiring the pilot to divert his vision from his orienting reference could lead to disorientation, each of three pilot subjects flying in F-100F jet aircraft was required to 1) make transition from visual flight reference to instrument flight reference upon sudden lowering of the hood and 2) attempt to maintain straight and level flight with eyes closed. The time to make transition and for the plane to attain a dangerous altitude was measured. The findings are discussed in relation to disorientation accidents. G. R 13

14,627

Klein, S. J., Mendelson, E. S. & Gallagher, T. J. THE EFFECTS OF HYPOXIA ON AUDITORY SENSITIVITY: II. THRESHOLD SHIFTS IN A QUIET ENVIRONMENT. Proj. TED NAM AE-5112, Rep. NAMC-ACEL-411, Nov. 1959, 15pp. USN Air Crew Equipment Lab., Naval Air Material Center, Penn.

To investigate the effect of hypoxia on auditory threshold shifts, seven male adults with normal hearing inspired a nitrogen-oxygen mixture of 9.6 per cent oxygen by volume for an average of 16 minutes. Auditory threshold shifts from the pre-hypoxic level were recorded during the reduced oxygen intake phase and for 40 minutes (ten-minute intervals) after return to normal breathing. Bone and air thresholds were determined for frequencies ranging from 256 to 4096 cps. in one octave increments in a quiet environment. Threshold shifts were analyzed as a function of frequency. T. G. R 11

14,628

Kidd, J. S. A COMPARISON OF TWO METHODS OF CONTROLLER TRAINING IN SIMULATED AIR TRAFFIC CONTROL TASK A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. Contract AF 33(616)-3612; Proj. 7184, Task 71583, WADC TR 58 449, Jan. 1959, 21pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Laboratory of Aviation Psychology, Ohio State University, Columbus, Ohio).

Improvement in performance in a complex task of radar air traffic control was compared for two conditions of training: 1) a constant high input load and 2) a graduated input load. Relative input load was defined as the number of aircraft under the control of a single pattern-feeder. Sixteen novice

14,629

controllers were divided into two matched groups and were given ten training trials under one condition. Performances on trial ten were compared on several criteria of efficiency and safety for the two training conditions. T. G. R 16

14,629

Helm, C. E. A MULTIDIMENSIONAL RATIO SCALING ANALYSIS OF COLOR RELATIONS. A TECHNICAL REPORT. Contract NONR-2214(00), Proj. NR 151-174, Ph. D. Dissertation, June 1959, 70pp. Dept. of Psychology, Princeton University, Princeton, N. J.

This study was designed to provide information relevant to the development of a uniform color scale and also to investigate the relations between two different multidimensional scales. Following an analysis of color models and uniform color scales and the problem of providing suitable data by multidimensional scaling procedures, a multidimensional triads ratio judgment experiment was carried out on a set of color chips using ten normal and four color defective subjects. The data were compared with those from two previous multidimensional successive intervals experiments. The findings are discussed for their relevance to the problem of scaling color relations for a uniform color scale. T. G. I. R 58

14,630

Hickson, R. H., Scott, D. M. & Boyes, G. E. DETECTABILITY ON CATHODE RAY TUBE SCREENS: COMPARISON OF PPI, INSIDE-OUT PPI, AND B-SCAN UNDER NOISE AND NOISE-FREE CONDITIONS. PCC Proj. D77 94-20-22, DRML Proj. 163, Rep. 163-15, H. R. 156, June 1959, 16pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

To compare target detection performance of operators on three types of displays, an experimental radar indicator (developed by the National Research Council of Canada) was used. This equipment will present any of three displays on the same CRT (cathode ray tube): 1) a normal Plan Position Indicator (PPI), 2) an Inside-out PPI, and 3) a B-scan. In one experiment the scope was noise-free; in the other a background of receiver generated noise was present. Detectability thresholds were obtained for a wide range of target locations and compared for effect of type of display, target range, and noise conditions. T. G. I. R 11

14,631

Hickson, R. H. VISIBILITY ON RADAR SCREENS: THE EFFECT OF SCOPE BRIGHTNESS AND RANGE. PCC Proj. D77-94-20-22, DRML Proj. 163, Rep. 163-17, H. R. 173, June 1959, 6pp. Defence

Research Medical Labs., Toronto, Ontario, Canada.

To investigate visibility thresholds for radar screens as a function of both scope brightness and range, two subjects made threshold judgments of target visibility on a 12 DP7A plan position indicator cathode ray tube (CRT) for five screen brightnesses and nine ranges. Range was in tenths of the radius of a five-inch sweep line and scope brightnesses (expressed as CRT bias voltage) were 45, 46, 47 (optimum), 48, and 49. The task was to report a target as soon as it became visible in a designated half-inch square. Mean threshold values were analyzed for effect of CRT bias, range, and test days. R 8

14,632

Hawkes, G. R. & Warm, J. S. COMMUNICATION BY ELECTRICAL STIMULATION OF THE SKIN. 1. ABSOLUTE IDENTIFICATION OF STIMULUS INTENSITY LEVEL. Proj. 6 95 20 001, Task USAMRL T-5, MEDEA, Rep. 400, Sept. 1959, 18pp. USA Medical Research Lab., Fort Knox, Ky.

The usefulness of current intensity level as a cue for signalling purposes was investigated. Four sets of stimuli of two, three, four, and five intensity levels each were selected for absolute identification. The levels selected ranged from 114 to 197 percent of the absolute threshold and were equally spaced in terms of equal subjective increments of sensation. Each of 24 subjects was tested on each stimulus series, with one series per session. The data (percent correct identifications) were analyzed for the amount of information transmitted (in bits) as a function of number of intensity levels. The results are discussed in terms of a communication system using this type of sensory input. T. G. I. R 14

14,633

Gibson, Eleanor J., Gibson, J. J., Smith, O. W. & Flock, H. MOTION PARALLAX AS A DETERMINANT OF PERCEIVED DEPTH. J. exp. Psychol., July 1959, 58(1), 40-51. (Cornell University, Ithaca, N. Y.).

To investigate the common assertion that motion parallax is a cue for depth perception, the optics of differential velocities of the elements in a field of view were examined and two cases were distinguished: that of two velocities in the field and that of a gradient of velocities. Two-velocity experiments were conducted with 1) two spots and 2) two superimposed textures to carry motion; velocity difference was taken to be the essential cue to depth judgments. Reports were obtained for a large and a small velocity difference and for a motionless field. With new groups of subjects the experiment was repeated with verbal instructions about

depth. The case of a flow of velocities (or flow-gradient) was also investigated. T. I. R 15

14, 634

Graham, C. H. & Hsia, Y. STUDIES OF COLOR BLINDNESS: A UNILATERALLY DICHROMATIC SUBJECT. Proc. Nat. Acad. Sci., Jan. 1959, 45(1), 96-99. (Columbia University, New York, N. Y.).

This paper presents some visual discrimination measurements made on a unilaterally dichromatic subject. The results of these measurements--color mixture, spectral sensitivity, and binocular color matches--are discussed in relation to visual theory. G. R 9

14, 635

Graham, C. H. COLOR THEORY. Reprinted from Psychology: A study of a science. Study 1: Conceptual and systematic. Volume 1. Sensory, perceptual, and physiological formulations, 1959, 145-287. McGraw-Hill Book Co., Inc., N. Y. (Columbia University, N. Y.).

The account of color vision and color theory given here adheres to the following outline. 1) An account is given of certain discriminations that are especially significant for color theory: hue discrimination, luminosity, saturation, complementary colors, the two-color threshold, and color mixture. 2) A discussion is presented of the Young-Helmholtz and Herring color theories with accounts of variations or expansions of them. 3) A final section presents some analytic and methodological aspects of the general topic of color theory. T. G. R 209

14, 637

Rand Corporation. A SELECTED LIST OF UNCLASSIFIED PUBLICATIONS OF THE SOCIAL SCIENCE DIVISION THE RAND CORPORATION 1948-1959. Proj. RAND, Res. Memo. 1403 4, May 1959, 36pp. The Rand Corporation, Santa Monica, Calif.

This document contains a revised list of unclassified Reports, Research Memoranda, and Papers that have been issued by the Social Science Division of the RAND Corporation from its inception to May 15, 1959. R 250 (approx.)

14, 638

Shearer, J. W., Peterson, D. A. & Slebodnick, E. B. TECHNIQUES FOR HUMAN FACTORS EVALUATION OF PROTOTYPE SPECIAL WEAPONS AND ASSOCIATED EQUIPMENT. Contract AF 29(601) 513, Proj. 7800, AIR 259 59 FR 198, AFSWC TR 59 14, April 1959, 132pp. USAF Special Weapons Center, Kirtland AFB, N. M. (American Institute for Research, Washington, D. C.).

A method for systematic evaluation of human factors aspects of prototype special weapons equipment was developed. From available related studies and military specifications as source data, a number of human factors guides were constructed and tried out during standard weapon system evaluations. From these preliminary guides three were developed and further refined during evaluations of both bomb-type and missile warhead special missions. The final techniques include: 1) a guide to evaluation of preliminary manuals or instruction pamphlets, 2) a guide to static evaluation of equipment, and 3) an observational record form used in functional try-outs of equipment for noting operational requirements for personnel, time and training. I. R 4

14, 639

Schonbach, P. COGNITION, MOTIVATION, AND TIME PERCEPTION. Contract N8ONR 66216, Tech. Rep. 2, Nov. 1958, 18pp. Laboratory for Research in Social Relations, University of Minnesota, Minneapolis, Minn.

On the basis of an exploratory study of social isolation, two hypotheses were suggested: 1) the force acting on a person in a barrier situation to reach a goal is an increasing function of the person's need for the goal "times" the relevance of this person's ideation with respect to goal; and 2) the greater within limits the magnitude of the force, the greater will be the person's estimate of the time spent in the barrier situation. These hypotheses were tested with female subjects in an experiment on "food tasting" in which deprivation of food, thinking about food, and the desire to eat corresponded to the concepts of need, relevance of ideation, and force. T. R 15

14, 640

Schaefer, V. H. & Ulmer, R. G. A REPRESENTATIVE BIBLIOGRAPHY OF RESEARCH IN LOW-FREQUENCY MECHANICAL VIBRATION. Proj. 6 95 20 001 05, Task 13, Rep. 405, Nov. 1959, 27pp. USA Medical Research Lab., Fort Knox, Ky.

The literature was surveyed for studies concerning the effects of low-frequency mechanical whole-body vibration. A few of the studies in each of the major areas--pathology and lethality, physiology, behavior, and theory and measurement--are discussed briefly. A number of the publications were selected for inclusion in a representative bibliography. R 188

14, 641

Tetley, W. H. THE CYBERNETIC THEORY OF LOGISTICS. Rep. M58 74, April 1958, 41pp. Industrial College of the Armed Forces, Washington, D. C.

The aim of this thesis is to evolve a Generalized Logistics Model and to express its parameters in terms of Information Theory. Part I deals with the basic principles necessary to construct such a model. Part II introduces the concept of an error-prone channel and discusses a Fundamental Theorem that can quite easily form the basis for a mathematical theory of logistics. G. I. R 9

14, 642

Stevens, S. S., Carton, A. S. & Shickman, G. M. A SCALE OF APPARENT INTENSITY OF ELECTRIC SHOCK. *J. exp. Psychol.*, Oct. 1958, 56(4), 328-334. (Harvard University, Cambridge, Mass.).

By the method of magnitude estimation, subjects having no previous experience in judging electric shock made numerical estimations of the apparent intensity of an electric current applied through salt-water electrodes to the fingers of one hand. A ratio scale of subjective intensity was constructed and compared with a category scale that was determined by having subjects judge various currents on a scale from one to seven. G. R 11

14, 643

Sperling, P. I. BIBLIOGRAPHY OF RESEARCH REPORTS IN PSYCHOPHYSIOLOGICAL STUDIES 1955-1958. Proj. 6 95 20 001, MEDDH HR, Rep. 359, March 1959, 15pp. USA Medical Research Lab., Fort Knox, Ky.

The titles of research reports in psychophysiology that have been sponsored by the U. S. Army Medical Service are listed alphabetically by author. The period covered is from 1955-1958. The various areas under which the research was performed are: 1) sound and hearing, 2) vision and perception, 3) complex behavioral processes, 4) coordination and balance, and 5) somatic influences. A subject-matter grouping of report numbers is included. R 143

14, 644

Tolhurst, G. C. SYSTEMS TESTING: FURTHER APPROACHES TO MICROPHONE EVALUATION. Contract N60NR 25525, ONR Proj. NR 145 993, BuMedSurg Proj. NM 18 02 99, Subtask 1, Rep. 85, Jan. 1959, 8pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To explore procedures that might be used in evaluating microphones and to set standards for evaluating system components, two questions were investigated: 1) Does bandwidth beyond that readily attainable contribute to speech reception? and 2) Does restricting the dynamic range of a system by various amounts of peak clipping contribute to message reception? Multiple-choice tests were recorded in noise by one voice using

two different microphones. One experimental series presented the signals full-band and low-pass filtered in noise and quiet; the other presented full-band recorded tests at six levels of peak clipping with a plus six signal-to-ratio white noise. There were 92 listeners. T. G. R 5

14, 646

Waldron, D. L. A PRELIMINARY STUDY OF THE EFFICIENCY OF LIMITED FREQUENCY MONITORING AUDIOMETRY IN THE AIR FORCE HEARING CONSERVATION PROGRAM. Rep. 59 89, Aug. 1959, 4pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

The Rudmose audiograms of 879 aircraft and engine maintenance men were examined in such a way as to answer two questions: 1) The poorest threshold level of hearing would have been identified in what percentage of this sample if tested only at 4000 cps? and 2) What percentage of those with a 15 decibel or higher hearing level, at any of the frequencies from 500 through 4000 cps, would have been picked up for more extensive testing if they had been screened at 15 decibels for 4000 cps only? The efficiency of using limited frequency audiometry that employs 4000 cps as the test tone is discussed in the light of the analyses. T. R 5

14, 647

Winterberg, R. P. & Channell, R. C. HUMAN FACTORS REVIEW OF RADIO SET AN/GRC-50. Contract DA 36 039 SC 73253, DA Proj. 3 99 00 100, Task Order 18, July 1959, 16pp. Dunlap and Associates, Inc., Stamford, Conn.

The AN/GRC Radio Set is reviewed in terms of the human factors involved in its operation. Possible operational difficulties are described, many of these being associated with the present control arrangement and design. Recommendations are made for design changes that should minimize operational problems. I.

14, 649

Lyman, J., Groth, Hilde, Ziedman, K., Fink, Carolyn J., et al. STUDIES OF EFFECTIVENESS OF ELIMINATION OF DISPLAYED INFORMATION WITH OBSERVER PRACTICE INCREASE. ANNUAL SUMMARY REPORT NOVEMBER 1958 - SEPTEMBER 1959. Contract NONR 233(49), Rep. 58 62, Oct. 1959, 15pp. Dept of Engineering, University of California, Los Angeles, Calif.

This report presents a review of research accomplishments during the year 1958-1959. Activities in three categories are described: 1) Development and check-out of an electronically controlled display

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14,655

and control panel with the necessary recording apparatus for the study of specified display variables in a perceptual-motor task; 2) Development of methodology and actual construction of a versatile paper-and-pencil test for the evaluation of redundancy in dial reading tasks; 3) Initial experimental investigations and subsequent statistical evaluation of a) probability distribution and performance effects of additional cues in the task, and b) performance effects of type and amount of redundancy on a simulated dial reading task. T. G. I.

14,650

Westbrook, C. B. THE PILOT'S ROLE IN SPACE FLIGHT. Proj. 1365, Task 13554, WADC TN 59 31, Feb. 1959, 16pp. USAF Flight Control Lab., Wright-Patterson AFB, Ohio.

Man's basic capabilities as a control element—as an actuator, sensor, computer, and as part of a complete control system—are discussed and some conclusions drawn as to his strong and weak points. Several factors that contribute to a change in thinking regarding flight control in space missions are reviewed, e.g., reliability, changed dynamic characteristics of the vehicles, and the new control systems required. The phases of a lunar soft landing mission are then reviewed to determine what functions should or must be done automatically and what should be done by man. Some conclusions are drawn as to man's role in a space vehicle. G. I.

14,651

Berbert, J. H. VISUAL ACUITY AS A FUNCTION OF INTENSITY FOR DIFFERENT HUES. Proj. NR 442 000, Task NR 442 003, NRL Prob. S03 03, NRL Rep. 5104, May 1953, 21pp. USN Research Lab., Washington, D. C.

To determine the influence of luminous intensity and hue on the resolution of fine detail, where the fine detail is two points of light matched in intensity and chromaticity on a dark background, threshold settings were made by two subjects. The task was to adjust one point of light (approach or recede) to an apparent "just-touching" position; the angular subtense at the eye was called the threshold angular subtense. Six colors were used: white and five others having dominant wavelengths near 400, 500, 550, 600, and 650 millimicrons. For each color a range of intensities was used. The data were analyzed to find the optimum hue and intensity range for such settings. T. G. I. R 12

14,652

Bushnell, D. MAJOR ACHIEVEMENTS IN BIODYNAMICS: ESCAPE PHYSIOLOGY AT THE AIR FORCE MISSILE DEVELOPMENT CENTER HOLLoman AIR FORCE

BASE, NEW MEXICO 1953 - 1958. 1958, 56pp. USAF Missile Development Center, Holloman AFB, N. M.

This monograph documents the contributions of Holloman's Aeromedical Field Laboratory to the understanding of the punishing effects of windblast and the tremendous forces of abrupt deceleration encountered during emergency escape from high-mach aircraft. The application of this experimentation to the effects of the magnitude and relatively long duration of g-loading experienced during sustained acceleration of multi-stage space vehicles is also discussed. A final section is devoted to conflicting views on escape: seats versus capsules. I. R 68

14,653

Chorafas, D. N. OPERATIONS RESEARCH FOR INDUSTRIAL MANAGEMENT. 1958, 303pp. Reinhold Publishing Corporation, N. Y.

This book presents a detailed explanation of some of the most recently developed analytic techniques used for managerial decision-making. The first chapters include the fundamentals of experimental model making, of game theory, of business simulation methods, and of strategic gaming. The later chapters are devoted primarily to modern allocation methods: linear programming, transportation and flow, matrix analyses for production scheduling and inventory control. A case study in strategic gaming and a mathematical model for simulated industrial competition are included. T. G. I.

14,654

Crook, M. N., Hanson, J. A. & Weisz, A. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: FAMILIAR FORMS VIEWED AGAINST PLAIN BACK-GROUNDS IN FACSIMILE COPY. Contract DA 49 007 MD 536, Interim Rep. 2, March 1955, 10pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

An experiment is described in which the effect of Gaussian noise on the recognizability of familiar forms against plain backgrounds is measured for forms of several levels of difficulty and for two printing definitions. Curves showing percent recognition as a function of signal/noise ratio are presented for the various combinations of conditions. G. I.

14,655

Flight Safety Foundation Inc. ACADEMIC TRAINING NEEDS IN HUMAN FACTORS ENGINEERING. Human Factors Bull. 59 5H, 1959, 1p. Flight Safety Foundation Inc., N. Y.

The suggested core curriculum presented in this paper represents an attempt to illustrate how a one-year graduate level program could be organized which would cover the range of topics thought to be of greatest importance by those now working in the field. Students with varied undergraduate preparation and work experience could be included providing they have an adequate background in the biological and physical sciences, mathematics through calculus, and probability statistics through the analysis of variance. R 1

14,657

Goldman, S. INFORMATION THEORY AND RADAR. Research Reviews, Jan. 1959, NAVEXOS P 510, 8-11. (Syracuse University, Syracuse, N. Y.).

This paper discusses the application of information theory to the analysis of radar problems. Some of the contributions made by such an approach, such as the use of long radar-transmitted signal waveshapes in place of short pulses, are discussed. I. R 2

14,658

Gordon, D. A. VISUAL DETECTION AND IDENTIFICATION: MILITARY APPLICATIONS. Proj. MICHIGAN, Memo Rep. 2144 397 R, April 1959, 23pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

This paper discusses the problems that arise in attempting a scientific approach to measures of visibility in a military setting. Questions of definition and of specific application are considered in problems of detection and identification. A final section is devoted to the solution of military visibility problems. T. G. I. R 11

14,659

Hale, F. C. & O'Hara, J. J. AN ENGINEERING ANALYSIS OF CARGO HANDLING - X ENERGY EXPENDITURE OF LONGSHOREMEN. Contract NONR 233(07), Rep. 59 20, June 1959, 49pp. Dept. of Engineering, University of California, Los Angeles, Calif.

To explore the energy cost and physiological cost of the longshoring task, a systems engineering study was carried out in the Los Angeles and Long Beach harbors. Energy cost was assessed by the indirect methods of oxygen consumption, heart rate, and ventilatory responses; activity measurements were made by systematic work sampling techniques. The energy expenditure data obtained for a variety of longshoring task was compared with known data from other industrial tasks. The percentage of work-cycle spent working was compared with earlier studies. Correlations between the two types of data were computed. It is

suggested that current work-rest relationships be reviewed in light of the findings of this study. T. G. I. R 59

14,660

Held, R. & White, B. SENSORY DEPRIVATION AND VISUAL SPEED: AN ANALYSIS. Science, Oct. 1959, 130(3379), 860-861. (Brandeis University, Waltham, Mass.).

To investigate changes in judgment of visual speed as a consequence of sensory deprivation, a series of experiments was conducted. The task was to observe a black bar sweep, like the second hand of a clock, through 90 degrees from a horizontal to a vertical position at a rate of 60 degrees per second; at the vertical the bar disappeared and a judgment was required as when the hidden bar would reach a fixed marker ten degrees beyond. Performance before and after the following conditions was analyzed: 1) eight hours patternless visual stimulation; 2) one-half hour of the same; 3) randomized visual stimulation (extrinsic noise); 4) hyperstable stimulation (exposure to a fixed pattern); and 5) dark exposure field. T. I. R 4

14,661

Hubbard, H. H. & Maglieri, D. J. AN INVESTIGATION OF SOME PHENOMENA RELATING TO AURAL DETECTION OF AIRPLANES. Tech. Note 4337, Sept. 1958, 49pp. National Advisory Committee for Aeronautics, Washington, D. C. (Langley Aeronautical Lab., Langley Field, Va.).

An investigation was conducted to evaluate the significance of the external noise level of an airplane with regard to its detection by ground observers. Modifications were made in the propulsion system of a single-engine airplane to reduce its external noise. Conventional noise level measurements consisting of broad- and narrow-band frequency analyses were made in static ground tests. Listening data were obtained with the aid of ground observers for cruise flights as well as take-offs, landings, and power-off glides for the modified and for an unmodified airplane. T. G. I. R 11

14,662

Iseley, C. W. & Carl, J. M. CRT TARGET DETECTABILITY WITH TRANSPARENT AND OPAQUE PHOSPHORS. Proj. NA 433 003 & NE 096 600 2, NRL Prob. R05 20, NRL Rep. 5413, Oct. 1959, 7pp. USN Research Lab., Washington, D. C.

As part of a program of research on visual factors in cathode-ray tube (crt) display systems, problems arising from environmental illumination are being investigated. An investigation was made of the target detectability characteristics of a transparent and

an opaque phosphor under moderate illumination conditions. A radar B-scope presentation was simulated; independent variables were crt grid bias, receiver noise, and type of phosphor; nine subjects participated in target detection tests. Detectability thresholds were analyzed for the effects of the independent variables and their interactions. T. R 8

14,663

Jones, G. M. DISORIENTATION IN FLIGHT. FPRC/Memo 96, Sept. 1958, 14pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

The main sources of information about orientation normally available to man (visual sensation and those special sensations responding to linear and angular movements) are related to problems of disorientation during flight. Attention is drawn to the unreliability of the sensing mechanisms other than the eyes during flight and evidence is given, drawn from experimental investigations, to show that even the eyes may feed misleading information to the brain. Implications for the aircraft designer are discussed. G. I. R 5

14,666

Krendel, E. S. THE SPECTRAL DENSITY APPROACH TO A PERCEPTUAL-MOTOR TASK. Airborne Electronics, 1952, 5pp. Franklin Institute Laboratories, Philadelphia, Penn.).

To study the human operator's frequency response, a method was selected in which the spectral density of the output was compared to the spectral density of the input, using a random signal as the input on a simple compensatory tracking device. The question of linearity of the operator's response was examined by comparing the amplitude frequency response for two subjects when tracking a distribution whose mean absolute amplitude was one centimeter, and another of two centimeters. The effect of practice was examined by comparing the output when the subjects were naive and when highly trained. The effect of instructions to track for accuracy and for speed was also examined. The suitability of the method for further research is discussed.

14,667

Lawrence, M. THE EFFECT OF OVERSTIMULATION AND INTERNAL FACTORS ON THE FUNCTION OF THE INNER EAR. Contract DA 49 007 MD 634, Prog. Rep. 9, Jan. 1958, 5pp. University of Michigan, Ann Arbor, Mich. & Kresge Medical Research Building, Ann Arbor, Mich.

This paper reports progress on a research contract in which some of the phenomena known, through electrical and histological studies, to occur within the cochlea are examined by audiometric means. The ultimate goal is to establish audiometric measures that can serve as a diagnostic tool to pinpoint the cause of altered hearing. Specifically, the dynamic range, as determined by measurements of the threshold of aural harmonics, has been investigated. Also the physiology and morphology of the cochlea in the normal condition as well as under the influence of various agents, particularly loud sounds, are being studied. Six studies concerned with the above topics are reviewed briefly. R 6

14,688

Peterson, G.M., Evans, J.L. & Weldon, R. J. ACCURACY IN CALCULATING ARITHMETICAL PROBLEMS OF VARYING COMPLEXITY. Engng. Res. Rep. SC 3896(TR), Oct. 1956, 103pp. Sandia Corporation, Albuquerque, N.M. (University of New Mexico, Albuquerque, N.M.).

To determine methods of solving arithmetical problems which would reduce the number of errors when human computers perform the work, college students in mathematics were used to test 11 different methods. These methods were of three types: partnership, worksheet, and self-check. The problems, simple to complex, involved the operations of addition, subtraction, multiplication, division, use of logarithms, single and double interpolations, and cross references to data in tables and graphs. Problems were analyzed to find all computational errors and analyzed for effect of method used, for factors contributing significantly to the scores, and for error types. T. G. I. R 48

14,669

Romba, J. & Martin, P. AN EXPLORATORY STUDY INTO THE EFFECTS OF LOW BLAST PRESSURE ON BEHAVIOR IN RHESUS MONKEYS. OCO Proj. TBI 1000, Rep. Tech. Memo. 11 59, Oct. 1959, 23pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

To provide information on animal behavioral phenomena under conditions of low level (five to seven pounds per square inch) blast pressure stimulations, four psychological-test-sophisticated Rhesus monkeys were administered the following tests before, during, and after blast exposure: object discrimination, delayed response, motor coordination, and locomotor activity. Changes in performance were observed and analyzed. G. I. R 24

IV-205

14,670

14,670

Schaefer, V. H., Ulmer, R. G., Link, H. J. & Yost, D. H. SOME BEHAVIORAL AND PHYSIOLOGICAL STUDIES IN VIBRATION. Proj. 6 95 20 001, Task USAMRL T 5, MEDEA, Rep. 389, June 1959, 31pp. USA Medical Research Lab., Fort Knox, Ky.

Four experiments designed to explore basic effects of whole-body vibration were studied. The variables studied were body weight, food intake, fecal output, water intake, urine output, open field activity, and elevated maze and straight-alley behavior. Pathological data were also obtained. Rats were used as subjects. The vibration frequency was at 25 cps, the motion was sinusoidal, and the displacement was 0.25 inch. The various experiments used varied schedules of food deprivation, vibration, and type of behavior test. The results are discussed in terms of behavioral and physiological functioning, evidence of adaptation, vibration as a stressor, and histopathological changes. T. I. R 23

14,671

Scharf, B. LOUDNESS OF COMPLEX SOUNDS AS A FUNCTION OF THE NUMBER OF COMPONENTS. J. Acoust. Soc. Amer., June 1959, 31(6), 783-785. (Northeastern University, Boston, Mass.).

To investigate the effect on loudness of complex sounds of varying the number of components within the sound, complexes of two, three, four, and eight tones, and a band of white noise were matched in loudness to a 1500 cycle tone. The overall spacing, ΔF , between the lowest and highest components of the stimuli were held constant at either 175, 1600, or 3400 cps. With the complexes centered around a given frequency, four loudness levels were tested (25, 50, 75, and 90 decibels Sound Pressure Level). The data were analyzed as a function of the number of components. An explanation of the findings is suggested. T. I. R 7

14,672

Stern, J. A. PHYSIOLOGICAL STRESS AND FOOD CONSUMPTION PROGRESS REPORT. Contract DA19 129 QM 802, Proj. 7 84 15 007, Rep. 6(Progress), Aug. 1958, 24pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (Washington University, St. Louis, Mo.).

The relationship between physical stress and a self-selection diet of rats was investigated. The physical stresses were food deprivation, forced activity, and cold exposure. The self-selection diet consisted of casein, sugar, fat, and salt. Pre-, post-, and during-stress measurements were taken of the rats' weight and their intake of water and different nutrients. G. R 17

14,673

Stevens, S. S. ON THE VALIDITY OF THE LOUDNESS SCALE. J. Acoust. Soc. Amer., July 1959, 31(7), 995-1003. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

This paper tries to answer certain objections relating to the validity of the sone scale (loudness scale). It is argued that the form of the sone scale can be verified by cross-modality matchings. Instead of working with numerical estimations of magnitudes or ratios, these new procedures allow observers to equate apparent intensity of stimuli in two different sense modalities. Results of these experiments are offered as evidence for the validity of the sone scale. An explanation of the subjective intensity function is offered. G 25

14,674

Stevens, S. S. (Dir.). PERIODIC STATUS REPORT XXXIV PERIOD COVERED: 16 MAY - 15 NOVEMBER 1959. Contract NONR 1866(15), Proj. NR142 201, & National Science Foundation Grant G 2668, PNM 85, Nov. 1959, 19pp. Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.

This report presents the status of work accomplished in the field of psychoacoustics by members of the Harvard Psychoacoustic Laboratory. Summaries are given for ten completed studies and for ten studies in progress. R 88

14,675

Stevens, S. S. THE QUANTIFICATION OF SENSATION. Daedalus, Fall 1959, 88(4), 606-621. (Psycho-Acoustics Lab., Harvard University, Cambridge, Mass.).

The problem of the measurement of sensation (reactions, verbal or otherwise, made by organisms in response to stimuli) is discussed in the light of recent research. The various types of scales that could be used for measurement are discussed and the ratio scale singled out for its use in quantifying the magnitude of sensation. The power law as shown in measurements of the relation of psychological magnitude to stimulus magnitude for several sensory modalities is discussed, and some experiments in cross-modality validation are reported. R 13

14,676

Sutro, P. J., Ward, H. O. & Townsend, C. A. HUMAN VISUAL CAPACITIES AS A BASIS FOR THE SAFER DESIGN OF VEHICLES. FINAL REPORT. Contract AF61 File 6 61 01 004, June 1958, 28pp. Medical Research Lab., CAA, Columbus, Ohio.

To complete the description of man's limits of fixation and total behavioral field of vision for a sedentary task (no body motion), final results are presented on the effects of combined movements of both head

and eyes on foveal and peripheral visual fields. Both maximum and moderate extents of head and eye movement are treated, with the latter taken as 45 percent of maximum. These results are based on data in the 1958 Annual Report. The results are discussed with regard to applications. Measurements are reported on the visual occlusion due to the obstruction of the subject's own body, with effects on visual field computed. In addition, some field tests on the use of fluorescent paint to make a vehicle more conspicuous are reported. T. I.

14,677

Toraldo di Francia, G. (Supervisor). BASIC RESEARCH IN THE FIELD OF VISION. FINAL REPORT. Contract AF 61(052)17, AFOSR TR 59 14, Nov. 1958, 28pp. Istituto Nazionale Di Ottica, Arcetri, Firenze, Italy.

The general object of the research, summarized in this paper, was to investigate some specific effects of contrast and of interaction which arise due to a variation of the light stimulus with time. Three topics were studied: 1) the role of eye movements in vision, 2) the mutual interaction of the two eyes, and 3) the influence of the time variation of the luminance on fusion conditions and on electroretinal response. Practical application to light signals is discussed. T. G. I. R 26

14,678

Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics. PROBLEMS IN MILITARY AUDIOMETRY: A CHABA SYMPOSIUM. 6. AUTOMATIC AUDIOMETRY. PO 06401, NE 121303 I(NEL N2-1), Dec. 1957, 28pp. USN Electronics Lab., San Diego, Calif. (Reprinted from: J. Speech Dis., Dec. 1957, 22(5), 729-756).

This symposium was concerned with problems facing the Armed Forces in establishing programs to test more accurately the hearing of candidates for military service. Because of the importance of adequate testing programs in the services, the relevant material from the symposium is presented here. The following aspects of the program are included: Veteran's compensation for hearing loss (Kenneth O. Johnson); Diagnostic audiometry (Gordon Hoopie); A classification of hearing tests (Ira J. Hirsh); Review of the report by the working group on audiometry (Raymond Carhart); Automatic audiometry (John C. Webster); Practical limitations in military audiometry (Aram Glorig); and Audiometry in the armed forces (The CHABA Council).

14,679

USN Research Lab. AN AIR TRAFFIC CONTROL COLOR DISPLAY. Proj. NR 416

000, Task NR416 002, & NE 010 234 2, BUSHIPS S 1736, April 1958, 9pp. USN Research Lab., Washington, D.C.

A cathode ray tube color display suitable for military purposes is described. A new method for obtaining color presentation and its application to an air traffic control display are discussed. The display is a two-color (red and green) five-inch Plan Position Indicator used in conjunction with the carrier all-weather flying monitor display. The two colors are used to differentiate between two categories of aircraft. I. R 4.

14,680

von Bekesy, G. NEURAL FUNNELING ALONG THE SKIN AND BETWEEN THE INNER AND OUTER HAIR CELLS OF THE COCHLEA. J. acoust. Soc. Amer., Sept. 1959, 31(9), 1236-1249. (Harvard University, Cambridge, Mass.).

This paper attempts to show that 1) the rotating tones in hearing, 2) the rotating vibrations on the skin, 3) the difference limen for the smallest perceptible distance on the skin, and 4) Mach's law of contrast are all a consequence of the same funneling action of the nervous system. A neural funneling unit is proposed that takes into account that a local stimulus produces both an area of activity and, around it, an area of decreased activity. The funneling action between these areas of sensitivity in the cochlea was investigated. The cochlear model (described earlier) was further developed to incorporate the findings. G. I.

14,681

Weldon, R. J., Yafuso, R. & Peterson, G. M. FACTORS INFLUENCING DIAL OPERATION: II, SPECIAL-PURPOSE DOUBLE-NUMBER DIALS. Engng. Res. Rep. SC 3839(TR), April 1956, 48pp. Sandia Corporation, Albuquerque, N. M. (University of New Mexico, Albuquerque, N. M.).

To determine the relative merits of three special-purpose, double-number dials, 96 subjects were tested. Each subject first took the dial booklet test in which he read and recorded settings from photographs of the dials; then he entered a booth where he was required to set the actual dials or to check settings already made. A total of 14,400 settings and checkings were made and recorded; time to perform each operation was also recorded. Number and magnitude of errors and time scores were analyzed for differences due to dial design. Dial test booklet results were analyzed to determine whether it was an accurate predictor of dial operation. A test of the hypothesis that checking errors are inversely related to frequency with which errors are encountered was made. T. G. I. R 8

14,683

14,683

Anderson, R. S., Stemler, F. W., McHugh, R. F., Jr. & Rogers, E. B. AIR BLAST STUDIES WITH ANIMALS. Subproj. 4 99 02 002 03, AFSWP 1110, CWLR 2288, July 1959, 23pp. USA Chemical Warfare Labs., Army Chemical Center, Md.

The damage to be expected in man due to the long duration blasts from bombs is not known at present. As a step in obtaining such information, a study of the extent and nature of injuries to large and small animals exposed to air blast in the large shock tube at the Ballistics Research Laboratory, Aberdeen Proving Ground, is under way. This report is of a pilot study, in which single goats, rabbits, and groups of mice were exposed in the tube under a number of conditions that varied, especially the extent of animal translation and the shock front characteristics. The feasibility of using the tube for such experimentation is discussed. T. G. I. R 6

14,684

Burgess, B. F., Jr. THE EFFECT OF TEMPERATURE ON TOLERANCE TO POSITIVE ACCELERATION. NADC MA 5905, Proj. NM 19 01 12.1, Rep. 16, May 1959, 10pp. USN Air Development Center, Johnsville, Penn.

To extend knowledge of the effect of heat on tolerance to positive acceleration and to explore the effect of environmental temperatures beyond the limit that could be compensated for by the body's normal heat regulatory mechanism, six trained centrifuge subjects received positive acceleration in a temperature range from 75 degrees to 160 degrees F. (Fahrenheit). Impairment in vision was used as the physiological end point, and changes in tolerance to acceleration was used as the criterion for determining the overall efficiency of the various mechanisms of the body in combatting the heat stress. Recordings of skin temperature, respiratory rate, heart rate, reaction time, and light error were made for all centrifuge runs. G. I. R 3

14,685

Brown, E. L. PSYCHOLOGICAL ASPECTS OF SPACE OPERATIONS, Sept. 1959, 7pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

Human performance during zero g has been studied while flying over 1000 zero g trajectories in a Convair C-131B transport airplane. A crew of about ten participated in each flight. A summary of the information gained is given in the following areas: 1) human performance on motor and mental tasks, 2) performance on actual emergencies, 3) human performance on experimental tasks, 4) locomotion inside and outside

space vehicles, and 5) human perceptive orientation.

14,686

Bowman, D. W., Dudsinski, J. J. & Shira, W. EFFECT OF LIGHT POLARIZATION ON THE COLOR APPEARANCE OF VARIOUS SURFACES AND SUBSTANCES. Ordnance Proj. TB 2 001, DA Proj. 5 B 99 01 004, Rep. 4102(Final), Feb. 1958, 19pp. USA Materials Lab., Detroit Arsenal, Mich.

To determine the effect of polarized light on the color appearance of vegetation and colored surfaces in the visible bands of the spectrum, spectrophotometric analysis of color transparencies was made. Natural vegetation and prepared specimens, utilizing natural sunlight and artificial illumination respectively, were photographed with and without a polarizing filter under identical conditions. Comparison exposures (on film strips) were then analyzed for spectral transmittance. T. G.

14,687

Baker, H. D., Doran, M. D. & Miller, K. E. EARLY DARK ADAPTATION TO DIM LUMINANCES. J. opt. Soc. Amer., Nov. 1959, 49(11), 1065-1070. (Dept. of Psychology, Florida State University, Tallahassee, Fla.).

To investigate the shape of the dark adaptation curve to dim light during the beginning of adaptation, visual threshold changes were measured at several intervals just before and just after a preadapting light was dimmed to several luminance levels. Five subjects were used. Threshold measurements were used to trace the beginning of dark adaptation. The implications of the findings for visual theory are discussed. G. I. R 17

14,688

Birdsall, T. G. DETECTION OF A SIGNAL SPECIFIED EXACTLY WITH A NOISY STORED REFERENCE SIGNAL. Contract AF 49(638) 369, Proj. 9778C, Task 37710, AFOSR TN 59 909, TR 93, Sept. 1959, 22pp. Research Institute, University of Michigan, Ann Arbor, Mich.

This report treats the optimization problem of detecting the presence of a signal in a background of white Gaussian noise under the restriction that the signal is specified exactly but the receiver memory contains only a noisy version of the signal. The optimum receiver is specified. The performances of both the optimum receiver and the cross-correlation receiver with a noisy memory are calculated and compared for a special case. While this study has implications for many fields, it is only the applications to psychophysics that are discussed here. G. I. R 3

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14,694

14,689

Bilger, R. C. LABORATORY FACILITIES EMPLOYED IN PSYCHOPHYSICAL MEMORY EXPERIMENTS. Contract AF 49(638) 369, Proj. 9778C, Task 37710, AFOSR TN 59 923, TM 72, Sept. 1959, 17pp. Research Institute, University of Michigan, Ann Arbor, Mich.

Equipment and operating procedures used in psychophysical memory experiments at Electronic Defense Group are described and illustrated. The equipment includes that used to generate and measure signals and noise, PSYTAR (Psychological Testing and Recording) the programming equipment, and ROMPAR (Random Orthogonal Message Presenter and Recorder). This equipment gives precise control of signal parameters and enables one to collect efficiently the large quantities of data required for specification of the parameters of the human hearing mechanism. 1. R 2

14,690

Behnke, A. R. MILITARY ASPECTS OF UNDERWEIGHT AND OVERWEIGHT. Res. & Devel. Tech. Rep. USNRDL TR 205 NS 080 001, Dec. 1957, 56pp. USN Radiological Defense Lab., San Francisco, Calif.

This study analyzes military standards for underweight and overweight individuals. Basic research pertinent to the analysis is summarized. The concept of an organized body pattern (distorted in the healthy individual only by an accumulation of excess fat) such that constants applicable to populations can be derived from measurements on a comparatively few individuals is examined in light of available anthropometric data. Anthropometric data are compiled for both a reference military man and a woman. A weight reduction experiment on one man (age 53) is described. T. G. R 40

14,691

Clarke, D. G. (Proj. Officer). OPTIMUM INSTRUMENT PRESENTATION AND PANEL ARRANGEMENT FOR ARMY ROTARY-WING AIRCRAFT. REPORT OF PROJECT NR AVN 457.8/59. Proj. NR AVN 457.8/59, Aug. 1959, 9pp. USA Aviation Board, Fort Rucker, Ala.

To determine the optimum panel arrangement for the "basic six" flight instruments in Army rotary-wing aircraft, aviators with varying amounts of experience flew helicopters under actual and simulated instrument conditions using various panel arrangements. Further testing and study were conducted to determine an optimum presentation for helicopter integrated instrument displays. Instrument flight was attempted from the copilot's seat, utilizing the pilot's instruments in order to determine whether a copilot's panel is required. Recommendations are included. 1.

14,692

Crosbie, R. J. THE REQUIREMENTS FOR MODIFICATION OF THE HUMAN CENTRIFUGE FOR HIGH PERFORMANCE AIRCRAFT AND SPACE VEHICLE SIMULATION RESEARCH. Proj. NM II 02 12.6, Rep. 3 & Proj. TED ADC AE 1410, Rep. NADC MA 5907, July 1959, 30pp. USN Air Development Center, Johnsville, Penn.

This paper presents a proposed modification program for the human centrifuge at the Aviation Medical Acceleration Laboratory. Specifications are given concerning centrifuge improvements as a dynamic simulator for space vehicle studies such as the X-15 and Mercury Project and for g-tolerance and performance investigations. A proposed 100 g capability for the centrifuge is discussed, and an interchangeable capsule concept is explained. Also presented are the detailed requirements for the complete program along with criteria for a feasibility study of the proposed modification. 1.

14,693

Carhart, R. & Jerger, J. F. A PREFERRED METHOD FOR CLINICAL DETERMINATION OF PURE-TONE THRESHOLDS. Rep. 59 91, Sept. 1959, 14pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Audiology Lab., Northwestern University, Evanston, Ill.).

This paper urges that clinical practices in the determination of pure-tone thresholds be standardized by using the basic features of the Hughson-Westlake technic. This technic was accepted in 1944 by the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology. The discussion 1) gives a brief description of an improved version of the Hughson-Westlake technic, 2) reviews those features of auditory behavior that determine the suitability of this method, and 3) reports an experimental comparison between this method and two other methods. T. R 29

14,694

Crook, M. N. EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. Contract DA 49 007 MD 536, Prog. Rep. 2, Oct. 1954, 11pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

This is a progress report of a study of the effect of noise in electro-visual display systems upon the recognizability of certain types of visual forms. Test copy is produced by facsimile printing with controlled amounts of white noise added to the printing signal. A set of 96 silhouettes representing familiar objects has been selected and prepared for testing. Some exploratory

14,695

studies are discussed and future plans detailed. 1.

14,695

Crook, M. N., Bishop, H. P., Coules, J., Gray, F. E., et al. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. Contract DA 49 007 MD 536, Final Rep., Jan. 1959. 15pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

This is a final report on a research program concerned with the factors affecting the perception of forms in an electro-visual display system (devices in which the visual display is characterized by a limit of resolution and is subject to degradation by visual noise) and related problems of the characteristics of form and subject responses. Samples of familiar and unfamiliar forms were developed and tested for recognition against plain and complex backgrounds under various amounts of degradation by visual noise in a prototype system. Research data from various interim and progress reports are reviewed and summarized. R 15

14,696

Cohen, A. C., Jr. ESTIMATION FROM RESTRICTED SAMPLES. FINAL REPORT. Contract DA 01 009 ORD 288 & Contract DA 01 009 ORD 463, Jan. 1959, 8pp. Dept. of Mathematics, University of Georgia, Athens, Ga.

This is a final report on a contract calling for the development of methods for estimation from restricted samples. Technical reports (15) issued by the contract and published papers (9) based on these reports are listed. A final technical report, "Centrally truncated samples from a normal distribution," is attached. T. G. R 27

14,697

Charipper, B. A. SUBMARINE DEPTH CONTROL WITH A COMBINED PITCH-ANGLE AND PITCH-RATE INDICATOR. P59 036, Electric Boat Tech. Rep. SPD 59 023, March 1959, 11pp. Electric Boat Div., General Dynamics Corporation, Groton, Conn.

To examine the value of pitch-rate information to submarine controllers, 18 male subjects (six in each of three experimental display conditions) were required to maintain pitch angle (Part I) and subsequently depth (Part II) of a simulated submarine. The three display conditions were: 1) pitch-angle indicator alone, 2) separate pitch-rate indicator added to the left of the pitch-angle indicator, and 3) combined pitch-rate and pitch-angle indicator.

Keeping pitch-angle and depth-keeping performance were analyzed for differences due to the displays used. T. G. I. R 2

14,700

Erdmann, R. L. AN INVESTIGATION WITH NEUTRAL DENSITY FILTERS OF THE RELATIONSHIP BETWEEN CRT SIGNAL DETECTION AND BRIGHTNESS DISCRIMINATION. Proj. 8501, Task 85001, RADC TN 59 318, Nov. 1959, 8pp. USAF Rome Air Development Center, Griffis AFB, N. Y.

Signal detectability on cathode ray tubes (CRT) depends primarily upon the brightness discrimination ability of the observer. Typical data on brightness discrimination indicates that this function improves continuously up to intensity values well above the maximum light output of a CRT. Yet, observations relating to voltage required for signal detection on CRT's to grid bias, which regulates light output, show a minimum value well below the bias that produces maximum light output. This report presents two previous explanations of this phenomenon and investigates the implications of one. Some special difficulties encountered when trying to apply brightness discrimination data to intensity modulated scopes are discussed. G. R 2

14,701

Enoch, J. M. THE EFFECT OF THE SIZE OF THE DISPLAY ON VISUAL SEARCH. Contract AF 30(602) 1580, OSURF Proj. 696, Proj. 1763, Task 39855, MCRL Tech. Paper (696) 15 279, RADC TN 59 64, Jan. 1958, 31pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

A part of an over-all program investigating visual search behavior, specifically with regard to photointerpretation, the effect of the size of display on visual search habits of a group of 12 untrained observers was determined. An ordered series of experimental aerial maps of different sizes were searched for a specific critical detail; eye traces were recorded. These records were analyzed for differences in pattern and efficiency (percent of eye fixations falling within the display area) due to size. The implications of the findings for visual search techniques and aids are discussed. T. G. R 8

14,702

Educational Research Corporation. A BIBLIOGRAPHY ON HUMAN FACTORS RELATED TO MANNED SPACE VEHICLES. Contract N 61339 294, ERC Proj. 49 6, Oct. 1959, 48pp. Educational Research Corporation, Cambridge, Mass.

This bibliography on human factors related to manned space vehicles is intended to supplement other listings in the same

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14, 707

area by adding to rather than by displacing them. A list of such sources is presented in the introductory notes. The studies are presented alphabetically by author and with annotations that are intended to give the reader some idea whether the citation refers to something he might be interested in. A subject index is included. R 130 (approx.)

14, 703

Enoch, J. M. THE EFFECT OF VISUAL SEARCH OF THE DEGREE OF GENERALITY OF INSTRUCTIONS TO THE PHOTINTERPRETER. A SUBTASK WHICH IS PART OF THE PROGRAM ON HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION. Contract AF 30(602) 1580, Proj. 1115, OSURF Proj. 696, Task 15001, RADC TN 58 299, MCRL TP (696) 14 270, Jan. 1958, 33pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

Since one of the main factors affecting a search pattern is the nature of the question given the photointerpreter, this study attempted to determine the effect of using general instructions to locate a class of objects. Three trained photointerpreters were presented a series of high quality small scale aerial photographs and given the following instructions with each: 1) Locate all recreational facilities; 2) Locate all railroad facilities; and 3) Locate all public utilities. The time limit was one minute during which eye movements were recorded and after which the subjects reported their findings. In a second part, airport symbols were searched for. The findings were compared to an earlier study having more specific instructions. T. G. 1. R 8

14, 704

Eiband, A. M. HUMAN TOLERANCE TO RAPIDLY APPLIED ACCELERATIONS: A SUMMARY OF THE LITERATURE. NASA Memo. 5 19 59E, June 1959, 93pp. National Aeronautics and Space Administration, Washington, D.C. (Lewis Research Center, Cleveland, Ohio).

The literature is surveyed to determine human tolerance to rapidly applied accelerations. Pertinent human and animal experiments applicable to space flight and to crash impact forces are analyzed and discussed. These data are compared and presented on the basis of a trapezoidal pulse. The effects of body restraint and of acceleration direction, onset rate, and plateau duration on the maximum tolerable and survivable rapidly applied accelerations are shown. T. G. 1. R 231

14, 705

Flanagan, J. L., Stevens, K. N., House, A. S., Wendahl, R. W., et al. RESEARCH ON SPEECH SYNTHESIS. Contract AF 19(604) 2061, AFCRC TN 58 140, Scientific Rep. 17, March 1958, 49pp. Acoustics Lab., Massachusetts Institute of Technology, Cambridge, Mass.

Speech communication research at the Massachusetts Institute of Technology during the period December, 1956 to March, 1958 under U. S. Air Force sponsorship is summarized. Included are studies of the production and perception of vowels and consonants and the development of instrumentation for the synthesis of speech. Particular emphasis has been placed on 1) measurements of resonance bandwidths of the vocal tract, 2) studies of the production and perception of fricative and of nasal consonants, and 3) completion of digital-analog system for the control of speech synthesizers, particularly a dynamic analog speech synthesizer. T. G. 1. R 25

14, 706

Forsyth, D. M. & Brown, C. R. FLICKER CONTOURS FOR INTERMITTENT PHOTIC STIMULI OF ALTERNATING DURATION. J. opt. Soc. Amer., Aug. 1959, 49(8), 760-763. (Dept. of Psychology, Johns Hopkins University, Baltimore, Md. & USAF Operational Applications Lab., Bolling AFB, Washington, D. C.).

Flicker studies generally employ a train of light pulses consisting of a single period of stimulation repeated serially. When fusion points are measured using trains of pulses in which alternate periods were of different duration, a fusion contour can be obtained which identifies those combinations which, when alternated serially, result in a transition point between flicker and fusion. In this study, data were obtained on three flicker contours each of which identifies those combinations of two periods which, when alternated serially, have the same apparent rate of flicker. The implications of the findings for visual theory are indicated. T. G. 1. R 2

14, 707

Faylor, R. C. CONSIDERATIONS OF HUMAN ENGINEERING FACTORS IN THE DESIGN OF AN ADVANCED SURVEILLANCE SYSTEM. SC Contract DA 36 039 SC 74899, SC Proj. 3 38 01 401 & DA Proj. 3 38 00 400, Engineering Rep. R252 032, 7pp. Fairchild Engine & Airplane Corporation Hagerstown, Md.

14, 708

The importance of human engineering for satisfactory operation of a system is discussed. Basic human characteristics are next related to ultimate system performance in terms of an advanced surveillance system, the OSPREY, that is in the process of design, development, fabrication and testing. The application is made to the two separate functions of the system: the drone control and the sensory system.

14, 708

Grieve, D. W. & Humphries, W. J. A. A NEW HEART BEAT DETECTOR AND ITS ANCILLARY RECORDING AND TELEMETRY SYSTEMS. Rep. 87, July 1957, 16pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

A heartbeat detector that will provide a useful method of detection of heartbeats (and their telemetry if required) when the subject is engaged in exercise is described. The device is electronic and employs two ECG (electrocardiograph) channels whose outputs are compared in a coincidence circuit that enables the heart signal to be discriminated from muscle interference. A new feedback device produces an audio oscillation at each beat of the heart and can be used to operate telemetry and recording systems. The applications of this device are discussed. I. R 9

14, 709

Flight Safety Foundation Inc. AUDITORY DISPLAY FUNCTIONS. Human Factors Bull. 59 6H, 1p. Flight Safety Foundation Inc., New York, N. Y.

This bulletin sets forth, in tabular form, auditory display functions and the type of signal (tones, complex sounds, or speech) that is preferred. Requirements for satisfactory speech communication and for warning and caution displays are itemized. T. R 2

14, 710

Garner, W. R. THE DEVELOPMENT OF CONTEXT EFFECTS IN HALF-LOUDNESS JUDGEMENTS. J. exp. Psychol., Sept. 1959, 58(3), 212-219. (Johns Hopkins University, Baltimore, Md.).

To determine whether differences between subject's half-loudness judgments could be predicted and controlled by deliberate manipulation of stimuli heard in a preliminary series, 135 subjects were required to make half-loudness judgments with the method of constant stimuli. Three variables were used: 1) the range of intensities of comparison stimuli in the main series of judgments, 2) the range of intensities in a preliminary series, and 3) the length of the preliminary series. The data were studied

by analysis of variance techniques to determine the main sources of variance. The usefulness of this type of judgment is discussed in light of the findings. T. G. R 4

14, 711

Garner, W. R. AN ARGUMENT FOR THE USE OF DISCRIMINABILITY SCALING PROCEDURES IN SCALING SENSORY INTENSITIES. Contract N5 OR1 166, Proj. NR 145 08, Task Order 1, Rep. 166 1 221, reprinted from the Proceedings of the Fifteenth International Congress of Psychology, Brussels, 1957, 4pp. Johns Hopkins University, Baltimore, Md.

The thesis of this paper is that those psychological methods using the Fechnerian assumption that psychological units of magnitude or intensity can be equated with units of discriminability are more legitimate, valid, and useful for the scaling of sensory intensities than are those methods using various types of direct response on the part of an observer. To support this thesis, the author uses information derived from research in audition--primarily that of loudness scaling.

14, 712

Hartgering, J. B. THE INFLUENCE OF RADIATION ON RECOVERY. Milit. Med., Sept. 1958, 123(3), 210-215. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D. C.).

Some implications of radiation on the clinical course and medical management of familiar battle injuries and disease are discussed. The specific pathological processes in the radiation syndrome and particularly their time of onset are considered in relation to the known requirements for treatment of familiar injuries and disease and their potential impact on logistic factors are estimated. The need for sound research directed along clinical lines is emphasized. T. G. R 1

14, 713

Hasbrook, A. H. HUMAN IMPACT SURVIVAL AT 162 G. Contract NONR 401(21), AV CIR 58 0 101, March 1959, 6pp. Aviation Crash Injury Research of Cornell University, Phoenix, Ariz.

A free fall, survived by a man, involving an impact of approximately 162 g for 0.014 second and an onset rate in excess of 22,000 g per second is reviewed for its significance in the problem of crash safety.

14, 714

Graham, C. H. & Hsia, Y. COLOR BLINDNESS AND COLOR THEORY. SOME DISCRIMINATIONS OF NORMAL AND DICHROMATIC SUBJECTS INCLUDING A UNILATERALLY COLOR-BLIND PERSON.

A. M. A. Arch. Ophthal., Oct. 1958, 60 (Part II), 792-799. (Columbia University, New York, N. Y.).

A report is made of research on the luminosity functions of normal subjects as contrasted with those of protanopes and deuteranopes. Data from this research is presented followed by a description of observations on a subject who gave color-blind (dichromatic) discriminations with the left eye and normal ones with the right eye. Luminosity curves, flicker curves, brightness matches, color mixture, hue discrimination, and color naming and matching data are presented for this subject. These data are discussed in relation to color theory. G. R 14

14, 716

Knauf, G. M. (Chm.). INVESTIGATORS' CONFERENCE ON BIOLOGICAL EFFECTS OF ELECTRONIC RADIATING EQUIPMENTS 14-15 JANUARY 1959. TECHNICAL REPORT. Proj. 5545, RADCR 59 67, July 1959, 45pp. USAF Rome Air Development Center, Griffiss AFB, N. Y.

This report contains reports of progress by investigators working on the biological effects of electronic radiating equipments. The various studies of microwave irradiation include work with animals, work with cellular organisms, instrumentation, measurement techniques, and the like. T. G. 1. R 11

14, 717

Merz, F., Jr. SHIPBOARD EVALUATION OF EXPERIMENTAL WINTER FLIGHT DECK IDENTIFICATION CLOTHING--OPERATION "CONVEX". Proj. NT001 052, Sub-Proj. 04. Clothing and Textile Div. Rep. 32, 1958, 9pp. USN Bureau of Supplies & Accounts, Department of the Navy, Washington, D. C.

To evaluate an improved model of an experimental winter flight deck identification vest, 50 vests in six colors and two sizes were issued to a selected group of personnel aboard the USS Takawa whose duties would subject the garments to daily usage on the flight deck. Following three weeks at sea, information was gathered from the wearers as to the vest's visibility, functional utility, comfort and durability. Advantages or disadvantages over the standard identification items were also elicited. Recommendations are included. 1. R 4

14, 718

Knapp, M. J. & Bernier, J. L. THE RESPONSE OF ORAL TISSUES TO ULTRASOUND. J. Amer. Dent. Ass., Jan. 1959, 58, 50-61.

A histologic study of the effect of the ultrasonic dental machine on teeth, their supporting structures, interpremaxillary

and intermandibular suture regions, and the temporomandibular joint was carried out on 15 young adult dogs. The dogs were divided into five groups of three each. Cavities were prepared in the canines, and first molars on the left side and the contralateral teeth served as controls. Exposure time was varied for each group: 36, 18, 9, 4-1/2, and 2-1/2 minutes. The three dogs were sacrificed at 2, 10, and 30 days postoperatively and examined for changes due to exposure time and to elapsed time after exposure. T. R 29

14, 719

Karpovich, P. V., Herden, E. L., Jr., & Asa, M. M. ELECTROGONIOMETER AND ITS USE IN THE STUDY OF JOINTS. Contract DA 49 007 MD 889, July 1959, 49pp. Dept. of Physiology, Springfield College, Springfield, Mass.

A new device, called a universal electrogoniometer, which makes possible automatic measuring and recording of changes in the angles formed by articulating bones is described. The validity, reliability, and objectivity of the device are discussed. Records of angle changes in various activities including trunk bending, squatting, stepping-up-and-down, walking, running, and bicycling are given. Knee electrogoniograms made on artificial and paralyzed legs are also included. The center finder, a device for locating the axis of rotation in a joint, is described, and suggestions for its use are made. T. G. 1. R 3

14, 720

Lazet, A. & Walraven, P. L. A COMPARATIVE STUDY OF THE READING OF LINEAR AND LOGARITHMIC SCALES. Rep. IZF 1959 16, 1959, 8pp. Institute for Perception RVO-TNO, Soesterberg, The Netherlands.

The interpolation characteristics of some linear and logarithmic scales were determined under identical conditions. In both instances, the scale was projected on a screen for three seconds and the subject responded with the value he thought the pointer indicated. Every scale was presented with nine different pointer positions. From an analysis of errors on the linear scale by 32 subjects, values for the log scale were calculated and compared with actual values. Some possible explanations of interpolation characteristics of linear scales are advanced. G. R. 1

14, 721

Lee, R. H., Whitten, F. I. & Brown, F. W. III. THE EXPLOSIVE DECOMPRESSION COMPONENT OF AIR BLAST. Proj. NM 64 01 23 BUMED, Medical Research Rep. 4, June 1959, 82pp. USN Mine Defense Lab., Panama City, Fla.

This report deals solely with explosive (rapid) decompression from pressures above atmospheric down to ambient atmospheric pressures and under conditions uncomplicated by the other blast wave parameters. To demonstrate that "engineering formulae" can be developed and applied to biophysical aspects of explosive decompression, equations, derived from the study of a biophysical analog presumed to simulate the mechanical action of explosive decompression on living animals, were applied to the data from a series of experiments in which mice were exposed to this condition under a wide range of pressures and times. Estimated time constants were compared with actual physical measurements. T. G. R 12

14, 722

MacGrinmon, K. R. & Jackson, J. R. A HAND-COMPUTED VERSION OF UCLA EXECUTIVE DECISION GAME NO. 2. Management Sciences Research Project, Res. Rep. 59, May 1959, 40pp. University of California, Los Angeles, Calif.

An example of a competitive manufacturing and marketing game for use as a laboratory experience in decision-making, where no computer facilities are available, is presented. Structurally, this game is almost identical with the widely played "University of California, Los Angeles, Executive Decision Game No. 2" (originally coded for the International Business Machines 650), but can be hand-computed by two persons in a cycle time of approximately 20 to 30 minutes per move. Appendices contain computing forms, nomographs, and tables. T. G. I.

14, 723

McKee, J. W. SINGLE-DEGREE-OF-FREEDOM SIMULATOR INVESTIGATION OF EFFECTS OF SUMMING DISPLAY-INSTRUMENT SIGNALS ON MAN-MACHINE CONTROL. NASA TN D 148, Dec. 1959, 30pp. National Aeronautics and Space Administration, Washington, D. C.

A study was undertaken to evaluate human control performance on a simulated vehicle having poor stability, a proportional acceleration control, and an instrument responding to displacement or to summed displacement, velocity, and acceleration information. The effects of combinations and variations of the display signals were studied. T. G. I. R 2

14, 724

Miller, E. F. II. EVALUATION OF CERTAIN VISUAL AND RELATED TESTS: VI. SPECIAL PHORIA TESTS. Proj. NM 14 01 II Subtask 6, Rep. 7, July 1959, 24pp. USN School of Aviation Medicine, Naval Air Station, Fla.

Four special tests (Vernier Alignment, Monocular Projections, Phoria-Monocular Field, Phoria-Binocular Field) have been reported to detect visual difficulties not otherwise revealed. These tests were evaluated as possible additional visual screening devices for pilots, since there is some evidence that undetected visual anomalies may interfere with their comfort and efficiency in flying. The four special tests and two standard tests of phoria (Risley prism and Maddox rod) were used to test 115 incoming naval cadets; 60 cadets were retested one week later. Comparisons of data from all tests were made and test reliability was studied. T. G. I. R 6

14, 725

Montague, W. E., Baldwin, R. D. & McClure, A. H. THE EFFECTS OF WEARING THE CBR PROTECTIVE MASK UPON THE PERFORMANCE OF SELECTED INDIVIDUAL COMBAT SKILLS. Contract DA 49 106 QM 1, DA Proj. 095 50 000, HUMRRO TR 57, June 1959, 44pp. Human Resources Research Office, George Washington University, Washington, D. C.

The effects of wearing the protective mask on individual combat skills were measured during the first hour and after five consecutive hours of masking. Performance test scores of masked soldiers were compared with their scores when tested under comparable conditions without masks. The skills tested were: driving vigilance, radio communication, target detection with unaided vision and with binoculars, firing shoulder weapons, cross-country running, and unaided voice communications. Implications for Army training practices and for combat command decision-making are discussed. T. G. I. R 3

14, 726

Michel, E. L. & Ewing, C. L. PHYSIOLOGICAL SIGNIFICANCE OF BREATHING PATTERN CHANGES AS A MEANS OF DETECTING HYPOXIA A REVIEW. Proj. TED NAM AE 5112, Rep. NAMC ACEL 407, Aug. 1959, 9pp. USN Air Crew Equipment Lab., Naval Air Material Center, Penn.

A review of the pertinent literature on factors influencing breathing pattern changes was made in an effort to determine whether an oxygen-want warning system based on the "normal breathing pattern" could give physiologically significant information concerning the presence of hypoxia. An analysis of reported findings was made. Included also is a discussion of the significance and limitations of the breathing pattern affected by hypoxic stimuli. R 31

14, 727

Peters, G. A. PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE FLIGHT AN ANALYSIS OF SOME OF THE PSYCHO-SOCIAL-SEXUAL PROBLEMS WHICH MAY OCCUR IN MANNED SPACE FLIGHT. Engng. Paper 916, Nov. 1959, 19pp. Equipment and Safety Research Section, Douglas Aircraft Company, Inc., El Segundo, Calif.

An analysis is presented of presently available information regarding the psychological hazards of extended space flight. Based upon the results of the analysis, attention is directed to problems of selection, training, and psychological environment of astronautic crew members. The need for research conducted to determine the relative importance of the various psychological factors and to find means to overcome or compensate for such hazards is stressed. I. R 42

14, 728

Prichard, A. C. EXPECTANCY EVALUATION AS AN AID TO DECISION MAKING. DA Proj. NR 3 55 00 200, Signal Corps Task NR 3 55 01 201, Tech. Memo. NR M 1929, Nov. 1957, 18pp. USA Signal Engineering Labs., Fort Monmouth, N. J.

A method is described for deriving a measure of the degree of certainty with which human reactions to a given situation may be anticipated. This method of situation evaluation is intended to supply a logical and quantitative foundation upon which decisions can be based. Techniques are outlined for breaking down a complex situation into simpler aspects. Division of work into sub-tasks enables a changing situation to be analyzed continuously. The range of situations that may be evaluated by this method extends from personal to national. T. G.

14, 729

Richman, M. W., Enoch, J. M. & Fry, G. A. THE EFFECT OF LIMITING THE TIME ALLOWED FOR SEARCH UPON VISUAL SEARCH PATTERNS. Contract AF 30(602) 1580, OSURF Proj. 696, Proj. 1115, Task 15001, MCRL Tech. Paper (696) 12 268, RADG TN 58 234, Jan. 1958, 29pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

To ascertain the effect of limiting the time allowed for search upon visual search patterns of photointerpreters, six experimental aerial maps were used, each of which contained a simulated railroad line and a target, Landolt "C," near a line. Two groups of four subjects were required to locate the target. Group I was allowed 20 seconds search time, although they were not informed of the time limit. Group II

was treated identically for the first two maps; then before each of the next four maps a time limit of 12, 9, 6, and 3 seconds was posted. A record of the actual time taken to locate the target and of eye movements was analyzed for effects of these time instructions. T. G. I. R 4

14, 730

Reid, A. M. A COMPARATIVE TRIAL OF GOGGLES, MULTI-PURPOSE, IN THE MIDDLE EAST. Rep. 76, July-Aug. 1955, 54pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

To ascertain the adequacy of two different prototypes of multipurpose goggles with particular reference to dual and glare in a comparative trial with current British issue Goggles, M. T. and Eyeshields, A. T., both objective and subjective measurements were made using 40 soldier subjects for the former and five separate units for the latter. Field trials were carried out in the Canal Zone; meteorological, dust intrusion, and airborne dust concentration data were collected. Adequacy of visual acuity and field of vision were determined, and the effect on acuity of differing transmission values of various colored lenses was assessed. Subjective information was obtained on dust and glare protection, misting, fit and comfort, and compatibility with headgear. T. G. I. R 15

14, 731

Schwarz, G. ON SOME NON-ORTHOGONAL FACTORIAL DESIGNS. Contract NONR 266(59), Proj. 042 205, Rep. CU 6 59, June 1959, 19pp. Columbia University, New York, N. Y.

A class of multifactorial designs are defined and analyzed in this paper. The designs considered have each a total number of observations that cannot be divided equally among cells in the design; however, by distributing the observations in a way that is in a certain sense symmetrical, the equations that determine the least squares estimates of the parameters become explicitly solvable. The case of two non-interacting factors with arbitrary numbers of levels is treated. After defining the designs, the estimates and their variances and covariances are computed. A general discussion of the symmetries and algebraic properties involved is given. R 3

14, 732

Shurrager, P. S. POLYMERIZATION OF VITREOUS HUMOR SUBSTRATE IN LIGHT AND DARK ADAPTATION. FINAL REPORT. Contract AF 18(600) 578, IIT Proj. 6062, AFOSR TR 58 161, Dec. 1958, 140pp. USAF Office of Scientific Research,

Washington, D. C. (Illinois Institute of Technology, Chicago, Ill.).

This report contains data and conclusions from several phases of a six-year research project. Included are new physical and chemical properties of vitreous humor during light and dark adaptation and changes that occur throughout adaptation. Psychophysical studies of human threshold sensitivity are presented and discussed as to their relationships to the processes in the vitreous. Unique methods for obtaining these data and presenting them in terms of known quantal and energy contents are given. Interrelationships among ERG components are analyzed and new techniques for analysis of cyclic phenomena are described. Practical applications of the findings to aviation and military operations are suggested. T. G. I. R 8

14, 733.

Tolhurst, G. C. LISTENER RECEPTION: THE EFFECTS OF: PART I - DIOTIC AND DICHOTIC PEAK CLIPPING PART II - REINTRODUCING SELECTIVE FILTERING AT VARIOUS INTERRUPTION RATES PART III - SPECIFIED AMOUNTS OF PEAK CLIPPING. Contract N6ONR 22525, ONR Proj NR 145 993 & Bumedsurg. Proj. NM 18 02 99, Subtask I, Rep. 82, Jan. 1959, 20pp. USN School of Aviation Medicine, Naval Air Station, Fla.

Part I. To determine the effects of various levels of peak clipping upon speech signals presented diotically and dichotically (modified signal to one ear and clear signal to the other), multiple-choice test lists were presented to panels of listeners. Part II. To study effects of modification of the speech signal upon listening, a clear recording of multiple-choice tests was high- and low-pass filtered, then interrupted at six rates. Resultant signals were then recorded upon a clear recording and played to panels of listeners. Part III. Multiple-choice test lists, peak clipped at six different levels, were responded to under conditions of quiet and plus six decibels of white noise. T. G. R 22

14, 734

Townsend, C., Fry, G. A., & Enoch, J. M. THE EFFECT OF IMAGE DEGRADATION ON VISUAL SEARCH: AERIAL HAZE. Contract AF 30(602) 1580, OSURF Proj. 696, Proj. 1155, Task 15001, MCRL Tech. Paper (696) 13 269, RADC TN 58 275, Jan. 1958, 35pp. Ohio State University Research Foundation, Columbus, Ohio.

The effect of general contrast reduction of photographic displays (simulating the effect of aerial haze) on visual search was investigated. Five displays (maps) were used, each of which contained similar content and map symbols; on each was a

Landolt "C" at a short distance from a railroad symbol. The over-all contrast was different for each map. Four subjects were required to find the Landolt "C" near the railroad and to signal when found. The time to locate the target and a record of eye movements were analyzed for efficiency of search and pattern of search as affected by image degradation. T. G. I. R 13

14, 735

Vos, J. J. A NEW APPARATUS TO MEASURE THE STILES-CRAWFORD EFFECT ALL OVER THE PUPIL. Rep. IZF 1959 14, 1959, 19pp. Institute for Perception RVO-TNO, Soesterberg, The Netherlands.

An apparatus is described with which it is easy to measure the Stiles-Crawford effect over all the pupil. The principle upon which the apparatus is constructed, the basic arrangement, the actual apparatus, and its use in praxis are discussed. A mathematical analysis of the accidental and systematic errors is presented. G. I. R 6

14, 736

White, O. E. A STUDY OF THE POSSIBLE APPLICATION OF CLOSED-CIRCUIT TELEVISION AS A TRAINING MEDIUM AT FRANCIS E. WARREN AIR FORCE BASE, CHEYENNE, WYOMING. M. S. Thesis, June 1958, 84pp. University of Wyoming, Laramie, Wyo.

An investigation into possible means of improving training efficiency through utilization of closed-circuit television was conducted. A review of related research and of the various training curricula at Warren Air Force Base was made to ascertain which areas would be most suitable for closed-circuit television. Classroom sessions were visited and current practices observed; interviews with instructor personnel were also held. Specific training activities were then selected in which the television technique could be used, equipment requirements and estimated costs were submitted, and the effect upon personnel requirements was discussed. T. R 50

14, 737

Wenzel, D. G. & Rutledge, C. O. THE DOSE-EFFECT AND DURATION OF ACTION OF SEVERAL CNS STIMULANTS ON MOTOR AND PSYCHOMOTOR PERFORMANCE. Contract NONR 583(09), Dec. 1959, 25pp. School of Pharmacy, University of Kansas, Lawrence, Kan.

To evaluate central stimulants on human performance, four drugs (caffeine, d-amphetamine, methylphenidate, and phenmetrazine) were studied for their effects on five relatively standard tests of performance (two types of tapping rate, two types of reaction time, and a motor pursuit task).

Fifteen practice subjects were tested; each subject was tested on 13 afternoons, each time receiving a different treatment. The first test was always a control after which the drugs (dosage varied) or a placebo were administered followed by further testing. The test data were analyzed for effect of the drugs, drug dosage, and time elapsed after drug administration. T. G. R 24

14, 738

USA Office of Research & Development. FOURTH ANNUAL ARMY HUMAN FACTORS ENGINEERING CONFERENCE 9-11 SEPT. 1958, USA CHEMICAL CENTER, MD. 127pp. USA Office of Research & Development, Washington, D. C.

This report contains the proceedings and papers (12) of a conference held to provide direct interchange of information on human factors engineering among personnel of Army development agencies, and between these and representatives of user agencies and other qualified personnel. Papers given include "Application of user guidance to equipment design," "Decrements in driving skill as a function of cumulative environmental stresses," "Vestibular functions in angular acceleration," "Ordnance design concepts for ground mobility," "Minimal subsistence requirements to maintain performance," "Infrared binoculars," and "Human Factors problems of combat surveillance in mobile warfare." T. G. I. R 12

14, 739

Ewbank, K. H. APPLICATION OF USER GUIDANCE TO EQUIPMENT DESIGN. Report from Fourth Annual Army Human Factors Engineering Conference 9-11 Sept. 1958, USA Chemical Center, Md., 4-7. USA Office of Research & Development, Washington, D. C.

The application of user guidance to all stages in the design and development of equipment for the Army is discussed. The problem of how such guidance should be given is discussed and some measures proposed for solving this problem.

14, 740

Herbert, M. J. DECREMENTS IN DRIVING SKILL AS A FUNCTION OF CUMULATIVE ENVIRONMENTAL STRESSES. Report from Fourth Annual Army Human Factors Engineering Conference 9-11 Sept. 1958, USA Chemical Center, Md., 13-15. USA Office of Research & Development, Washington, D. C. (USA Medical Research Lab., Fort Knox, Ky.).

This paper describes a research program, underway at Fort Knox, on complex psychomotor functions. The rationale for the program is discussed in terms of the mobility aspects of modern warfare and the corresponding demands upon the soldier.

Initial efforts are being directed to the problems of skill-fatigue in vehicle driving and the identification of basic skills underlying the driving task. Test instruments are being designed which will be sensitive to various motor skill patterns and the stressfulness of several environmental factors is being measured.

14, 741

Guedry, F. E. VESTIBULAR FUNCTIONS IN ANGULAR ACCELERATION. Report from Fourth Annual Army Human Factors Engineering Conference 9-11 Sept. 1958, USA Chemical Center, Md., 15-26. USA Office of Research & Development, Washington, D. C. (USA Medical Research Lab., Fort Knox, Ky.).

A program of research in vestibular functions during angular acceleration is described. Part of the current work is devoted specifically to the study of phenomena that occur when a person moves his head with respect to the axis of rotation of a turntable. All variables considered to be relevant--angular velocity, angular acceleration and deceleration, time factors, direction, position of head, visual orientation, etc.--are being investigated. Completed work dealing with the theoretical control of vestibular reactions by the vestibular end-organ are discussed. Some data are presented. G. I. R 9

14, 742

Timberlake, T. G. HUMAN ENGINEERING IN CORPS OF ENGINEERS EQUIPMENT DESIGN. Report from Fourth Annual Army Human Factors Engineering Conference 9-11 Sept. 1958, USA Chemical Center, Md., 47-54. USA Office of Research & Development, Washington, D. C. (USA Engineer Research and Development Lab., Fort Belvoir, Va.).

This paper discusses informally some of the human engineering aspects of the work done in the Army Engineer Research and Development. Since most of their equipment is commercially available, emphasis has been placed on maintenance studies. One area where the human factors have been stressed is the design of equipment for Arctic operation. A program being conducted to develop a family of air-transportable construction equipment for use in assault-type operations is discussed in terms of the human factors involved. T. I.

14, 744

Withington, V. POSITIONAL AND STEERING ERRORS IN HARBOR NAVIGATION. Contract NONR 609(02), NR 238 001, LMP:640:7, Tech. Memo. 41, June 1957, 7pp. Laboratory of Marine Physics, Yale University, New Haven, Conn.

14, 745

This paper examines the requirements for an all-weather navigation system for surface vessels in harbors and harbor-approach areas which would permit the use of the present precise steering potential of such vessels. Present errors of navigation under the most adverse conditions are analyzed in terms of instrumental errors, combined instrumental and dead-reckoning errors, precise track delineation, and steering and the time factor. Some of the essentials for the desired system, as indicated by the analysis, are discussed. G. I. R 8

14, 745

Lefler, J. H. FIXED-WING INSTRUMENT PRESENTATION. FINAL REPORT OF TEST PROJECT NR AVN 1557. Proj. 1557, Dec. 1958, 47pp. USA Aviation Board, Fort Rucker, Ala.

To determine the optimum attitude and navigation instrument and/or instrument system presentation for use in Army fixed-wing aircraft, instrument-qualified aviators, with more than average amounts of instrument experience, flew under instrument conditions, using various panel arrangements. Existing attitude and navigation instruments as well as integrated instrument systems (Collins Integrated Flight Systems FD-103C and FD-105, and Sperry Integrated Instrument System) were evaluated. An optimum panel arrangement of flight instruments is recommended for standard Army airplanes.

14, 746

USAF Air Research & Development Command Headquarters. HUMAN ENGINEERING ARDC TECHNICAL PROGRAM PLANNING DOCUMENT FOR THE FISCAL YEAR 1959 OPERATING PROGRAM. ASTIA AF TPPD 57 780E, Aug. 1957, 61pp. USAF Air Research & Development Command Headquarters, Baltimore, Md.

This document supersedes the Technical Program Planning Document entitled "Human Engineering" dated August 1956. Section I treats the military problem in this area as one of determining man's capabilities and limitations and to apply this knowledge to the design of weapons systems. Section II attempts to evaluate present capabilities and limitations in accomplishing this aim with the discussion organized around equipments or operations in which the basic tasks of the operator are similar. Section III points to several possibilities for gaining more information of human behavior characteristics. Technical requirements are given in Section IV.

14, 747

USAF Air Research & Development Command Headquarters. PERSONNEL AND TRAINING ARDC TECHNICAL PROGRAM PLANNING DOCUMENT FOR THE FISCAL

YEAR 1959 OPERATING PROGRAM. ASTIA AF TPPD 57 780G, Aug. 1957, 73pp. USAF Air Research & Development Command Headquarters, Baltimore, Md.

This document revalidates and brings up to date Technical Program Planning Document on "Air Force Personnel and Air Force Training," dated August 1956. The major sections are 1) the military problem, 2) evaluation of present capability and limitations, 3) technical possibilities, and 4) technical requirements.

14, 748

Schock, G. J. D. A STUDY OF ANIMAL REFLEXES DURING EXPOSURE TO SUBGRAVITY AND WEIGHTLESSNESS. Proj. 7851, Task 78501, AFMDC TN 59 12, June 1959, 15pp. USAF Aeromedical Field Lab., Holloman AFB, N. M.

Several experiments were conducted to study the role of the vestibular apparatus during states of subgravity and weightlessness. A number of cats were used in which either the vestibular portions of the VIII cranial nerves were sectioned bilaterally or the vestibular cortical area of the brain had been removed surgically two months before testing. A comparison of the labyrinthine and postural reflex behaviors of these animals and unoperated cats during periods of weightlessness were observed during aircraft flights where this condition was achieved. T. R 6

14, 749

Schock, G. J. D. AIRBORNE GALVANIC SKIN RESPONSE STUDIES A PRELIMINARY REPORT. Proj. 7851, Task 78501, AFMDC TN 59 14, June 1959, 9pp. USAF Aeromedical Field Lab., Holloman AFB, N. M.

Research conducted by the Aeromedical Field Laboratory into the effects of weightlessness has included the recording of galvanic skin response of human subjects exposed to 30-40 seconds of weightlessness achieved in flying jet aircraft in Keplerian trajectories. Electrocardiogram recordings were also made. The data relating to pre-weightlessness, accelerations, and weightlessness were examined for significant changes due to these factors. Instrumentation techniques for the measurements made are described. R 3

14, 750

Stembridge, V. A., Crafft, W. M. & Townsend, F. M. MEDICAL INVESTIGATION OF AIRCRAFT ACCIDENTS WITH MULTIPLE CASUALTIES. J. Aviat. Med., Sept. 1958, 29, 668-675. (Armed Forces Institute of Pathology, Washington, D. C. & USN School of Aviation Medicine, Naval Air Station, Fla.).

Suggested methods for handling multiple casualties from aircraft accidents are outlined: permission for post-mortem examination, handling bodies at the scene, identification problems, external examination, autopsy with histopathologic and toxicologic studies, and liaison with other accident investigators. A case is presented illustrating the actual performance of these steps.

14, 751

Silliphant, W. M. ROLE OF THE ARMED FORCES INSTITUTE OF PATHOLOGY IN AMERICAN MEDICINE. A. M. A. Arch. Surg., Aug. 1958, 77, 153-161.

A brief resume of the Armed Forces Institute of Pathology (AFIP) historical background is given along with an explanation of its relationship with other Federal agencies. The three-fold mission of AFIP is discussed: consultation, education, and research in pathology. Liaison activities with civilian medicine are outlined. The organization of the Institute and its relationship with Walter Reed Army Medical Center are defined. Recent accomplishments are discussed. 1.

14, 753

Renaud, G. E. INTELLIGIBILITY TESTING OF VOICE COMMUNICATION SYSTEMS TECHNICAL NOTE. Proj. 4562, RADC TN 59 156, May 1959, 6pp. USAF Rome Air Development Center, Griffiss AFB, N. Y.

This report describes methods of testing voice communication. Particular emphasis is placed on the use of PB-50 (phonetically balanced) lists, developed by Harvard University, in testing actual speakers and listeners. T. G. R 4

14, 754

Ronchi, L. MAY OCULAR TREMOR EVOKE FLICKER SENSATION? Atti Della Fondazione Giorgio Ronchi, March-April 1959, XIV(2), 140-141. (AFOSR TN 59 778).

Flicker sensations have been observed to occur in the light adapted eye when a field containing thin luminous stripes was spaced with large dark stripes. The characteristics of ocular tremor and of critical flicker frequency data are discussed in relation to this observation. R 4

14, 755

Runyon, R., Gordon, N. B. & Chajet, G. RELATIVE MOTION TRAINING (A PRELIMINARY ANALYSIS). NAVTRADEV CEN Proj. 20RM1, Tech. Rep. NAVTRADEV CEN 20 RM 1 1M, Sept. 1958, 16pp. USN Training Device Center, Port Washington, N. Y.

This report examines the performance of a variety of perceptual-motor skills in relative motion situations and evaluates the potential of appropriate training systems. The various types of motion situations studied are those in which vehicles are involved in 1) independent motion, 2) collision courses, 3) pursuit courses, and 4) fixed positional relationships. The types of problems that exist for the operator are clarified; hypotheses concerning the types of skills and/or knowledge involved in responding appropriately are formulated; cues used in the "inside-out" (apparent) orientation are differentiated from those used in the "outside-in" (real) orientation; some of the mathematical relationships are expressed; and some training problems likely to be encountered are discussed. G. I. R 4

14, 756

Patoski, V. A. & Marjon, P. L. PARTIAL SHIELD REMOTE MAINTENANCE EXPERIMENT. Contract AF 33(600) 32054, Proj. 6(1 9964), ANP Doc. NARF 58 23T MR N 214, July 1958, 30pp. Convair, Fort Worth, Tex.

An exploratory investigation was made to determine the feasibility of applying the partial shield concept to airplane servicing. A mechanic using long-handled tools performed several inspection and maintenance tasks on a B-47 airplane from within a partial shield mock-up. For each task a record was kept of the mechanic's working time, technique, and operating difficulties. The results were evaluated in terms of major problem areas: work efficiency, accessibility, shield location, operator considerations, and tools. T. I. R 2

14, 757

Mann, H. (Proj. Engr.). REQUIREMENTS FOR FORMATION LIGHTS ON HIGH PERFORMANCE CARRIER AIRCRAFT. FINAL REPORT. Proj. TED PTR AE 8025, ET311 248, Rep. 1, June 1959, 12pp. USN Air Test Center, Naval Air Station, Md.

To establish formation light requirements on high performance carrier-based aircraft, flight evaluation of the existing formation lights on the F11F-1 and F3H-2 airplanes was made. Rheostats were installed in the tail position and in each of the wing position formation light circuits; the pilots of these craft were instructed to vary the rheostat settings in accordance with instructions from various wingmen flying in formation with them. Records were made of the settings that gave good distance and attitude cues without glare. Two settings, one for good visibility and one for poor visibility conditions, were established. Recommendations are made pertaining to

14, 758

the number, locations, dimensions, colors, and intensities of lights. I.

14, 758

McAbee, W. H. A HUMAN FACTORS STUDY OF THE AUTOMATIC GROUND CONTROL APPROACH SYSTEM (AGCA). APGC Proj. 4513Y1 F, APGC TN 59 23, June 1959, 83pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

This human factors study was conducted in conjunction with the functional and operational evaluation of the Automatic Ground Control Approach (AGCA) system to evaluate 1) the human engineering aspects of the equipment, 2) personnel training and skill levels required by Air Force maintenance and controller personnel to maintain and operate the equipment, 3) safety factors, including confidence level of operators, and 4) adequacy of related publications. Based on analysis of data obtained from questionnaires, check lists, individual and group interviews, participation in airborne missions, and collections of job performance data, certain conclusions were drawn and recommendations made. T. I. R 6

14, 759

Lawrence, M. THE EFFECT OF OVERSTIMULATION AND INTERNAL FACTORS OF THE FUNCTION OF THE INNER EAR. Contract DA 49 007N MD 634, Prog. Rep. 10, Jan. 1959, 12pp. Physiological Acoustics Lab., University of Michigan, Ann Arbor, Mich.

This bulletin reports research in progress in the general area of the causes of deafness. During the year 1958 one of the projects was the study of the effects of overstimulation and internal factors on the inner ear. The technique used, recording of the electrical potentials arising from the inner ear when stimulated by sound, has been studied extensively. A series of experiments on functional changes in inner ear deafness is reported. A histological study of the development of sensory-cell innervation in the inner ear and three studies dealing with the relation between the middle and inner ear are among the seven studies described. A list of all reports from 1955 to 1959 is appended. R 23

14, 762

Brough, J. N. (Senior Proj. Officer). ATTITUDE INDICATOR TYPE FIM. CEPE Rep. 1386, Feb. 1959, 10pp. RCAF Air Materiel Command, CEPE, Ottawa, Canada.

To determine the suitability of the Attitude Indicator Type FIM as a flight instrument, flight trials were carried out in a CF100 aircraft. The indicator was mounted together with a sweep second hand clock on an auxiliary panel in the front cockpit. Both

day and night flights were made with beacon and ground controlled approaches being made at the conclusion of every flight. The flight assessment was done by visual reference to the actual horizon. Advantages and limitations of the instrument were noted and suggestions were made for improvements in design. I. R 1

14, 763

Holliday, Audrey R. THE EFFECT OF LSM UPON PAIN SENSITIVITY. QUARTERLY REPORT COVERING THE PERIOD JULY 1, 1958 TO SEPTEMBER 30, 1958. Contract DA 18 108 CML 6364, Nov. 1958, 6pp. University of Washington, St. Louis, Mo.

To investigate the analgesic effect of d-lepergic acid morpholide (LSM), pain thresholds to radiant heat were measured on ten subjects under two conditions: 1) after taking LSM at a dose level of four micrograms per kilogram of body weight, and 2) after taking a placebo. The withdrawal thresholds were analyzed for differences due to the drug. T. R 6

14, 765

Furchtgott, E. EFFECT OF HUNGER AND SATIETY ON ODOR SENSITIVITY. PROGRESS REPORT. Contract DA19 129 QM 844, DA Proj. 7 84 15 007, Rep. 10, Oct. 1958, 5pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.

Gustatory (sucrose) and olfactory (iso-amyl-acetate) thresholds were determined for eight subjects. Measurements were made at noon and at three o'clock in the afternoon, either after a "high" caloric lunch or after no lunch. The data were analyzed for differences due to hunger or satiety. This is a preliminary report of this investigation. T. R 1

14, 766

Ernst, A. A. FEASIBILITY STUDY FOR A MAN-MACHINE SYSTEMS RESEARCH FACILITY. Proj. 7184, WADC TR 59 51, March 1959, 245pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (US Department of Commerce, National Bureau of Standards, Washington, D. C.).

This report presents the results of a study of the feasibility, design, and cost of a large-scale tool to be used in research on man-machine systems. The fundamental postulates for such a facility are discussed. Feasibility was judged through designing, implementing, and operating a scale model of the desired facility. This process served to delineate the characteristics of the necessary equipment. Conclusions as to how well the design objectives might be met and how much the facility and its operation might

cost are also based on the model study.
T. G. I.

14,767

Crook, M. N. EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. Contract DA 49 007 MD 536, Prog. Rep. 1(Quarterly Prog. Rep.), July 1954, 14pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

Exploratory work was done to map out conditions for systematic testing of the effect of noise on the recognition of familiar visual forms against an unstructured background. About 80 silhouette forms representing familiar objects were reproduced by facsimile printing with a supplementary noise circuit. Copy were produced by this method under various degrees of random noise, the signal/noise ratio being expressed in decibels. Recognition scores for the noisy test forms were obtained from a small group of subjects. These results are to be analyzed with respect to a number of variables that might be important for further experiments. 1.

14,768

Coombs, C. H. AN APPLICATION OF A NONMETRIC MODEL FOR MULTIDIMENSIONAL ANALYSIS OF SIMILARITIES. Proj. MICHIGAN, Rep. 2144 269 T, June 1958, 13pp. Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

A nonmetric multidimensional model for analyzing similarities data is presented and its application to a confusion matrix on Morse Code signals is recounted. Some of the major problems remaining in the development of the model are summarized.
T. R 9

14,769

Creer, B. Y., Stewart, J. D., Merrick, R. B. & Drinkwater, F. J. III. A PILOT OPINION STUDY OF LATERAL CONTROL REQUIREMENTS FOR FIGHTER-TYPE AIRCRAFT. NASA Memo. I 29 59A, March 1959, 44pp. National Aeronautics and Space Administration, Washington, D. C.

As part of a program of research on airplane handling qualities, a pilot opinion study was made of the roll performance of fighter-type aircraft flying in their combat speed range. Both a stationary and a moving flight simulator were used, and the results were supplemented by tests in actual flight. The subjects were seasoned test pilots with engineering education and combat air veterans. Each subject was required to rate the roll performance of a given airplane or a given airplane simulation on a numerical rating scale. The data were analyzed in terms of a hypothesis that pilot opinion of lateral controllability would correlate with

a roll damping and an aileron power parameter written as roll acceleration. T. G. I. R 7

14,770

Goodson, J. E. & Miller, J. W. DYNAMIC VISUAL ACUITY IN AN APPLIED SETTING. Contract NONR 586(00), Proj. NR 142 023 & Burnedsurg. Proj. NM 17 01 99, Subtask 2, Rep. 16, May 1959, 13pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To determine the relationships between performance in the laboratory and in the air with regard to the visual pursuit of moving targets, 15 subjects were tested under both conditions. The air trials required the subject to view the ground target (two Landolt "C's") as the plane moved at angular velocities of 20, 60, and 90 degrees per second, and to indicate the position of the opening in each "C". Twelve target sizes were used to obtain threshold values at each velocity. A series of thresholds were then determined in the laboratory for one and for two targets. Threshold data were analyzed for effects of air versus laboratory conditions and for one versus two targets. T. G. I. R6

14,771

Gardner, R. A. PERCEPTION OF RELATIVE FREQUENCY AS A FUNCTION OF THE NUMBER OF RESPONSE CATEGORIES. USAMRL Proj. 6X95 25 001 02, Rep. 408, Dec. 1959, 10pp. USA Medical Research Lab., Fort Knox, Ky.

To study decision behavior in an uncertain situation where the only basis for choice was the perceived relative frequency of events in a series, the number of response categories was increased independently of the number of categories of events. The extra choices were dummies in that no hits could be obtained by choosing them. The subject (384 subjects) was instructed to predict the event (letter of alphabet) that he expected (letter was projected on screen after prediction) by inserting his response plug into the jack under the letter of his choice on a response panel. The relative frequency of choices for the most frequent events was analyzed in relation to the number of response categories. Rate of extinction of dummy choices was studied. T. R 11

14,772

Hale, H. B. HUMAN CARDIOACCELERATIVE RESPONSES TO HYPOXIA IN COMBINATION WITH HEAT. Rep. 60 14, Sept. 1959, 13pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

The effects of high ambient temperature on heart rate responses to moderate reductions in oxygen pressure were determined in healthy male subjects. Four experiments were performed: 1) decompression in a heated chamber (49 degrees C)

14, 773

from ground level to 18,000 foot pressure level with total time at reduced pressure of 15 minutes; 2) hypoxia induced by use of an oxygen-nitrogen mixture to an equivalent pressure of 18,000 feet slightly later than heat; 3) hypoxia (equivalent of 14,000 feet) imposed simultaneously with heat by the preceding method for 15-minute periods; 4) same as (3) but with a 45-minute period. The data (heart rate, skin and rectal temperatures, and ventilation) were analyzed for effects of hypoxia combined with heat. T. G. R 7

14, 773

Department of Civil Aviation.
PILOTS NOTES ON THE PRECISION
VISUAL GLIDEPATH (P. V. G.). DCA
Publ. 37, Aug. 1958, 6pp. Department of
Civil Aviation, Melbourne, Australia.

The Precision Visual Glidepath
(PVG) is a visual approach aid, for use in
visual meteorological conditions, which
gives visual guidance in relation to an
approach path defined by two bars of lights.
The arrangement of lights recommended for
runways is described and a representation of
PVG as seen by the pilot on final approaches
is presented. Following directions for the
method of use by the pilot is a summary of
pilot notes. 1.

14, 774

Brown, W. L., Carr, R. M. &
Overall, J. E. THE EFFECT OF WHOLE-
BODY RADIATION UPON ASSOCIATION
OF PERIPHERAL CUES. Rep. 58 47,
March 1958, 4pp. USAF School of Aviation
Medicine, Randolph AFB, Tex. (University
of Texas, Austin, Tex.).

To test the hypothesis that chronic
irradiated monkeys differ from normal
monkeys in the degree of association of
peripherally placed cues, object-quality
stimuli were presented as discrimination
problems to three treatment groups: non-
irradiated, low-dose irradiated, and high-
dose irradiated. The subjects were assigned
randomly to three groups: 1) two successive
discrimination problems each day for five
days; 2) same except that the positive and
negative stimuli of the second pair were
presented six inches behind the positive and
negative pair of the other during training;
and 3) same as (2) except that the signifi-
cance of the stimuli was reversed. Trials
to criterion and each problem were averaged
and studied by analysis of variance tech-
niques. T. G. R 8

14, 775

Bishop, E. W., Abbott, W. C. &
Bowen, H. M. A METHODOLOGY FOR
THE EVALUATION OF GROUND SUR-
VEILLANCE RADARS. FINAL REPORT.
SC Contract DA 36 039 SC 73253, Proj.

3 99 00 100, Task Order .02, June 1959,
48pp. Dunlap and Associates, Inc.,
Stamford, Conn.

An evaluation program for ground
surveillance radars is developed in this
report. The general basis for evaluation
is discussed. A typical radar system is
used to develop an illustrative test program.
Special attention is given to human factors.

14, 776

Bell Helicopter Corporation. AD-
VANCES OF HELICOPTER/VTOL - STOL
PORTION OF ANIP ARMY-NAVY INSTRU-
MENTATION PROGRAM. Contract NONR
1670 (00), Bell Doc. D228 100 002, Aug.
1959, 36pp. Electronics Department, Bell
Helicopter Corporation, Fort Worth, Tex.

This brochure discusses in non-
technical language the salient advances that
have been made in the Helicopter VTOL-
STOL portion of the Army-Navy Instrumenta-
tion Program (ANIP). A general ANIP or-
ganization, philosophy, and information flow
chart is presented for general orientation to
the program. Advances in the following are
then discussed: human engineering; infor-
mation sensing and processing-sensing ob-
jects and air velocity, fundamental sensing,
computing, display amplifying, displaying,
and mechanisms amplifying; test and
evaluation-simulation and research helicop-
ters; and the future.

14, 777

Cumming, R. W., Lane, J. C. &
Baxter, J. R. INSTALLATION NOTES ON
THE PRECISION VISUAL GLIDEPATH
(P. V. G.). ARL Hum. Engng. Note 3,
July 1959, 17pp. Aeronautical Research
Labs. Australian Defence Scientific Service,
Melbourne, Australia.

The Precision Visual Glidepath is an
approach aid for use in moderate to good
visibility which gives visual guidance in re-
lation to an approach plane defined by two
bars of lights on the ground. This note is
mainly concerned with the design features of
the aid and its installation, and in particular,
shows how it might be set up in "difficult"
locations. 1. R 15

14, 778

Forbes, A. R. PREFERRED LOADS
FOR THE AUXILIARY FIRING HANDLE
OF THE MARK 3 EJECTION SEAT. FPRC
999, April 1959, 7pp. Flying Personnel
Research Committee, London, England.
(RAF Institute of Aviation Medicine, Farn-
borough, Hants, England).

To determine the optimum load on an
ejection seat auxiliary firing handle (two
handed pull), six male subjects were tested
under static conditions, and three male sub-
jects were exposed to positive accelerations
of five g. The range of loads investigated

was from 65 to 95 pounds. Techniques of absolute judgments and paired-comparisons were used. Recommendations are included. T.

14,779

Drucker, A. J. & Brown, Emma E. ABSTRACTS OF PRB RESEARCH PUBLICATIONS - FY 1959. Proj. 29560000, PRB Tech. Res. Note 105, Oct. 1959, 31pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D. C.

This report identifies both by publication serial number and by Research and Development Research Task all research publications prepared and released by the Personnel Branch of The Adjutant General's Office in fiscal year 1959. Abstracts giving the principal research findings in non-technical language are presented for the majority of the titles. R 37

14,780

Glanzer, M. & Glaser, R. THE VALIDATION OF PREDICTIONS CONCERNING PERSONNEL AND TRAINING REQUIREMENTS: A CASE STUDY. Contract NONR 2551 (00), Aug. 1958, 37pp. American Institute for Research, Pittsburgh, Penn.

The feasibility of predicting future personnel and training requirements for new weapons systems was evaluated. Statements concerning requirements that had been made two years previously on the basis of a prototype system were checked against a final model of the system now in operational use. Statements were obtained from three areas (knowledge of operation, operational maintenance, and trouble shooting), and items drawn from task analyses, proficiency test material, and equipment casualty analyses were rated with respect to their current applicability by a group of ten experts who were working with the operational missile. The ratings were analyzed for reliability. T. I. R 17

14,781

Feallock, J. B. & Briggs, G. E. DEVELOPMENT OF SYSTEMS RESEARCH AND DESIGN METHODOLOGY. QUARTERLY REPORT. Contract AF 33(616) 6166, Proj. 7184 & RF Proj. 894, Rep. 894 2, Oct. 1959, 13pp. Ohio State University Research Foundation, Columbus, Ohio.

This report describes progress made for the period July through September 1959 on the various systems experiments underway. These experiments deal primarily with Air Traffic Control with several exploratory experiments on suitable methodology for handling decision making in systems environment. Technical support studies have had two foci: the investigation of factors in

visual perception, and of factors to be considered in studying information processing and decision making by teams of individuals. Titles of reports completed are listed. R 2

14,782

Fenichel, R. L. & Kydd, G. H. A STUDY OF THE EFFECTS OF POSITIVE ACCELERATION UPON ERYTHROCYTE HYDRATION IN HUMAN SUBJECTS. Burnedsurg. Proj. NM 19 02 12 2, Rep. 1, & Rep. NADC MA 5904, May 1959, 11pp. USN Aviation Medical Acceleration Lab., Naval Air Development Center, Penn.

Human subjects were employed to study the effects of positive acceleration upon erythrocyte hydration. Venous blood samples were obtained just before the acceleration series was begun, after the third centrifuge run (2.5 g), and immediately after the last run (5.5 g). Acceleration exposure began at 1.5 g level and increased at 1/2 g increments with five minutes between runs, and was terminated upon the subject's loss of peripheral lights (about 5.5 g average for the unprotected subject). Index values of Mean Corpuscular Volume, Mean Corpuscular Hemoglobin, and Mean Corpuscular Hemoglobin Concentration were determined and analyzed. T. G. I. R 9

14,783

Fried, C. A STUDY ON THE EFFECTS OF CONTINUOUS WAVE JAMMING ON THE DETECTION OF ANTIAIRCRAFT OPERATIONS CENTER SYMBOLS. OCO Proj. TBI 1000, Tech. Memo. 9 59, Sept. 1959, 27pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

To investigate the effect of electronic interference or jamming on the detectability of four symbols (Circle, Cross, Half Circle, and Cross-Within-Circle), considered for adoption as Antiaircraft Operations Center Symbols, the shapes were shown to the subjects under three conditions of continuous wave jamming. Shape diameters remained constant. The task was to scan all quadrants of the display scope and report the number of hostile targets in each quadrant. Scanning time and number of errors were recorded and analyzed for each symbol as a function of noise level. T. G. I. R 5

14,784

Carr, W. J. SELF-INSTRUCTIONAL DEVICES: A REVIEW OF CURRENT CONCEPTS. Contract AF 33(616) 6526, Proj. 1710, Task 77535, WADC TR 59 503, Aug. 1959, 23pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Bucknell University, Lewisburg, Penn.).

A selective review of the literature on self-instructional devices is presented with

14,785

emphasis on those studies that provide for a functional analysis of the devices. Three major classes of variables that influence the effectiveness of learning by such devices are distinguished: characteristics of the device, of the program, and of the learner. Major attention is devoted to an analysis of the process of programming. Discussion is focussed on a number of variables that might affect the effectiveness of the programming. A working model is presented, based upon the process of conditioning. 1. R 37

14,785

Hemingway, A., Forgrave, P. & Birzis, Lucy. NERVOUS CONTROL OF SHIVERING. A SHIVERING SUPPRESSOR MECHANISM OF THE BRAIN STEM. Contract AF 18(600) 358, Proj. 22 1301 0009, Rep. 1, June 1954, 25pp. USAF Arctic Aeromedical Lab., Ladd AFB, Alaska. (University of California, Los Angeles, Calif. & Long Beach Veterans Administration Hospital, Long Beach, Calif.).

To determine the anatomical localization of a shivering suppressor region in the hypothalamus of cats, the Horsley-Clarke stereotaxic apparatus was used to hold the animal. Bipolar electrodes were used for stimulation. Action potentials were recorded to detect shivering or cessation of shivering along with visual observation. Thirty to 60 points in the hypothalamus were stimulated for each experimental animal. The location of these points were determined by microscopic examination of the brain after the animal had been killed. The data were used to map the anatomical region from which the suppressor effect can be evoked and to locate the most sensitive region. T. G. I. R 20

14,786

Lyman, J. (Proj. Leader). ARM PROSTHESIS RESEARCH. PROGRESS REPORT. Contract V1005M 2075, Res. Rep. 59 82, Dec. 1959, 12pp. Department of Engineering, University of California, Los Angeles, Calif.

Progress is reported on work conducted under a program of research in arm prosthesis. The different aspects of the work are: 1) fundamental studies to establish body control sites for application to externally powered prostheses, 2) physiological investigations of amputee temperature regulation and their responses to changes in the physical environment, 3) engineering analysis of biotechnical factors in control systems, 4) selected applications studies, and 5) sensory-motor control and feedback investigations. 1.

14,788

Kahn, A. & Cornog, D. Y. SPACING OF ON-OFF CONTROLS. Human Factors Data Bull. 39, June 1959, 4pp. Air Arm Division, Westinghouse Electric Corporation, Baltimore, Md.

This bulletin presents the results of two studies on the spacing of various types of ON-OFF switches on control panels. In the studies, each subject was required to move his right hand from a centrally located rest position to a switch and throw it as quickly as possible without touching or moving adjacent switches. Tables are included that give the characteristics of each switch, the mean and standard deviation of ten measurements of the tangential force (ounces) required to operate the switch, and a comparison of the toggle switches used here with push-button data. The percentage of "touching" error as a function of type of switch, distance between, and direction of throw is shown. T. I. R 2

14,790

Kahn, A. & Korotin, A. L. THE EFFECT OF THE NUMBER OF CATEGORIES OF DISPLAYED ERROR ON TRACKING PERFORMANCE. Human Factors Data Bull. 41, Aug. 1959, 3pp. Air Arm Division, Westinghouse Electric Corporation, Baltimore, Md.

To determine if sufficient control accuracy, which meets systems accuracy, can be achieved when the error signal is presented to the operator in discrete steps (as in a digital computer), subjects were required to track two functions that were combinations of sine waves of varying frequency. Four types of display error were used: 1) direction of error only, 2) error direction plus three indications of magnitude, 3) error direction plus six indications of magnitude, and 4) error direction and continuous magnitude. The results are shown graphically in terms of mean tracking error for the different types of error display. Implications for use of the digital display are discussed. G. I. R 1

14,791

Kidd, J. S. & Briggs, G. E. DEVELOPMENT OF SYSTEMS RESEARCH AND DESIGN METHODOLOGY. QUARTERLY REPORT. Contract AF 33(616) 6166, Proj. 7184 & RF Proj. 894, Rep. 1, July 1959, 18pp. Ohio State University Research Foundation, Columbus, Ohio.

This is a progress report on a research project dealing with research methods and operational principles for a range of man-machine systems. Because of the continuing nature of the research program some studies initiated under previous contracts will be finished under this one and

are reported here. Also, a complete list of technical documents from both contracts is included. Current operational studies of existing systems, research using task simulation, technical studies and supporting research are discussed briefly. R 46

14,792

Johnson, R. M., Burket, G., Hamilton, D., Haukeness, Helen, et al. DIFFERENTIAL PREDICTION WITH INCOMPLETE CRITERION DATA. Contract NONR 477(08), Public Health Research Grant M 743(03), Aug. 1959, 91pp. University of Washington, Seattle, Wash.

This study concerns the prediction of multiple criteria when there are incomplete criterion data. Such circumstances frequently occur in contexts such as the statistical prediction of college grades, where not every student takes one or more courses in each academic area. It is shown that the appropriate criterion is the conditional event, "success given that individual i participates in criterion activity j ," and that a "method of subgroups" can appropriately be used. This method is described and its disadvantages in computational labor discussed. Two short-cut methods are described and an empirical study made to ascertain whether these methods provide acceptable predictions. T. R 14

14,793

Hawkes, G. R. & Warm, J. S. COMMUNICATION BY ELECTRICAL STIMULATION OF THE SKIN: III. MAXIMUM I_t FOR ABSOLUTE IDENTIFICATION OF CURRENT INTENSITY LEVEL. USAMRL Proj. 6X95 25 001 05, Rep. 410, Sept. 1959, 13pp. USA Medical Research Lab., Fort Knox, Ky.

To determine the amount of information transmitted (I_t) by absolute identification of current intensity level under "ideal conditions", ten subjects were stimulated with electric current on the pad of the index finger and required to identify the current intensity level of the stimulus. One group was informed of the accuracy of their judgments, the other was not. Four sets of stimuli at four different intensity levels were selected on basis of preliminary data. Current values ranged from 113 to 295 per cent of the absolute threshold and were always less than tolerance level. The data were analyzed for effect of extension of physical range of stimulus intensities and knowledge of results. T. G. R 15

14,794

McFarland, F. A. THE ROLE OF PREVENTIVE MEDICINE IN HIGHWAY SAFETY. Amer. J. publ. Hlth., March 1957, 47, 288-296. (Harvard School of Public Health, Boston, Mass.).

The thesis presented here is that highway accidents fall within the province of preventive medicine and the health officer has as much responsibility for their control as he has for preventable diseases. The epidemiologic approach to highway safety is discussed in terms of what is presently known about host (driver) factors, host-agent (vehicular design) relationships, and host-environment (roadway, level of illumination, traffic, etc.) relationships. G. R 25

14,795

McRuer, D. T. & Krendel, E. S. THE HUMAN OPERATOR AS A SERVO SYSTEM ELEMENT. J. Franklin Inst., May & June 1959, 267(5 & 6), 1-49. (Franklin Institute Laboratories, Philadelphia, Penn.).

The role of human elements in certain closed loop control systems is considered. The analytic basis for measurements of human dynamics is presented in terms of the use of a quasi-linear mathematical model for the human operator—its describing function and remnant. Steady state describing functions measured by various experimenters in the field are discussed and the adaptive, optimizing behavior of the human operator is demonstrated. The remnants are also discussed and plausible sources for their origin postulated. The use of such knowledge by the systems designer is discussed. T. G. I. R 36

14,796

Unger, H. R. & Milch, L. J. THE EFFICACY OF TRILAFON IN POTENTIATING BONAMINE MOTION SICKNESS PROPHYLAXIS IN DOGS. Rep. 59 78, June 1959, 4pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

To determine whether the addition of trifalon^R (a drug used to relieve anxiety and tension) to bonamine^R (a drug with established protective capabilities against motion sickness) would afford greater protection against swing-induced vestibular stimulation than bonamine alone, a standardized swinging procedure was utilized to induce vomiting in a group of normal mongrel dogs. Susceptible animals were then randomly placed in three groups: placebo, bonamine^R, and bonamine^R combined with trifalon^R. Susceptibility indexes were computed and differences among the three groups compared. T. R 15

14,797

McFarland, R. A., Moore, R. C. & Warren, A. B. WHY DRIVERS HAVE ACCIDENTS. Public Safety, April 1956, 4pp. (Harvard School of Public Health, Boston, Mass.).

In this survey integrating within an over-all conceptual framework the information contained in the literature on the role of

human factors in vehicular accidents, an attempt has been made to present the various findings in ways useful to those seeking an understanding of the causes of motor vehicle accidents and having an interest in the development of more effective preventive measures. The framework used is epidemiological in nature. In the course of the discussion some of the research necessary for a complete understanding of the relationship among the driver, the vehicle, and the environment in producing accidents are indicated. This is a digest of a longer article.

14, 798

Loeb, M. & Riopelle, A. J. THE INFLUENCE OF INTENSE CONTRALATERAL STIMULATION ON THE LOUDNESS OF A LOW FREQUENCY TONE. USAMRL Proj. 6X95 25 001 01, Rep. 409, Sept. 1959, 11pp. USA Medical Research Lab., Fort Knox, Ky.

A hypothesis was developed on the basis of previous experiments that the acoustic reflex, once aroused, acts in such a way that it provides considerable attenuation for loud tones and little or none for fainter ones. To test this hypothesis a 2200 cps tone, loud enough to activate the acoustic reflex, was introduced to the left ear just before and overlapping that of a 500 cps test tone in the right ear. A comparison tone was then introduced and subjects asked to evaluate the relative loudness of the test and comparison tones. Subsequently the comparison tone was varied in intensity and adjusted by the subject to apparent equality with the test tone (varied from 70 to 105 decibels). The results are discussed in relation to the hypothesis. T. I. R 13

14, 799

Lunneborg, C. E., Jr., Brandt, Gloria, Haukeness, Helen, Hill, Anita, et al. DIMENSIONAL ANALYSIS, LATENT STRUCTURE, AND THE PROBLEM OF PATTERNS. Contract NONR 477(08), Public Health Research Grant M 743(4), Sept. 1959, 84pp. University of Washington, Seattle, Wash.

This study develops and describes a technique for the detection of some sources of configural information arising from test data. The general polynomial approach is used with techniques closely related to certain factor analytic procedures. Procedures are described for relating the technique to the systematic variation provided by a set of psychological measures and for utilizing any detected configural information as potential predictor variance in projected uses of those measures. The method is illustrated with data drawn from a study of the dimensionality of personality. The technique of latent class analysis is compared with the one described herein. T. R 31

14, 800

McFarland, R. A., Damon, A. & Stoudt, H. W. THE APPLICATION OF HUMAN BODY SIZE DATA TO VEHICULAR DESIGN. SP 142, Nov. 1955, 18pp. Society of Automotive Engineers, New York, N. Y.

Differences in human body size can sometimes have serious implications for the efficiency and safety, as well as the comfort, of vehicle drivers. This report outlines methods whereby data on human body size may be systematically incorporated into vehicular design. The 5th, 50th, and 95th percentiles of 30 pertinent body dimensions of commercial drivers and of 23 dimensions on 2500 military drivers are presented along with specific values for those cab dimensions definable on the basis of body dimensions. The use of the cab mockup in conjunction with subjects of known body size for determining those cab dimensions related to dynamic human measurements is described. T. I. R 12

14, 801

Mowbray, G. H. & Gebhard, J. W. MAN'S SENSES AS INFORMATIONAL CHANNELS. Contract NORD 7386, PB 151160, CM 936, May 1958, 64pp. US Office of Technical Services, Dept. of Commerce, Washington, D. C. (Applied Physics Lab., Johns Hopkins University, Silver Spring, Md.).

This review surveys in a general way what is known about man's ability to make use of his sensory capacities for the gathering of information. Where possible, comparisons between different sense modalities are made and the problem of sensory interactions is discussed. Finally, some suggestions are offered relative to the possible unburdening of men in complex environments by the judicious use of some of the subordinate sensory channels. T. G. R 128

14, 802

McRuer, D. T. & Krendel, E. S. A REVIEW AND SUMMARY OF TRACKING RESEARCH APPLIED TO THE DESCRIPTION OF HUMAN DYNAMIC RESPONSE. Reprinted from the 1958 Wescon Convention Record, Part 4, 254-262. Systems Technology, Inc., Inglewood, Calif. & The Franklin Institute, Philadelphia, Penn.

This paper reviews, in their historical perspective, some of the major findings of the joint efforts of engineers and psychologists to describe human dynamic behavior in man-machine systems. Only compensatory tracking studies are considered, especially those that have resulted in quasi-linear mathematical descriptions defining the human's status as a system element in continuous control loop tasks. An attempt is then made to delineate the present state of operator description as quasi-linear mathematical models. T. I. R 16

14,803

McFarland, R. A. HUMAN AND ENVIRONMENTAL FACTORS OF AUTOMOBILE SAFETY. SAE Transactions, 1956, 64, 625-654. (Harvard School of Public Health, Boston, Mass.).

This paper points to the multiple causation in most automobile accidents, thus attempts at control should involve consideration of the interaction among the driver, his equipment, and the environment. Of first importance are the basic physical, physiological, and psychological characteristics of the driver but these facts must be associated with specific aspects of the other two in order to understand, and so prevent, accidents. Studies relating to various aspects of this concept are reviewed and the need for carefully controlled experimental studies, epidemiological surveys, and statistical analysis is stressed. T. G. I. R 52

14,804

McFarland, R. A. HUMAN FACTORS IN HIGHWAY TRANSPORT SAFETY. SAE Transactions, 1956, 64, 731-750. (Harvard School of Public Health, Boston, Mass.).

This paper is primarily an extensive review of two broad research programs in highway safety and of human factors in vehicular accidents. After showing that highway accidents are a major problem to the nation and that most accidents have multiple causes, it is argued that a successful approach to accident prevention requires consideration of the relationships and interactions between the driver, his equipment, and his environment. The types of research needed are discussed and illustrative findings were cited from various studies, such as driver activity analysis, application of anthropometric data to vehicle design, design of instruments and controls, crash injury research, and environmental factors. T. G. I. R 70

14,805

McFarland, R. A. HUMAN ENGINEERING: A NEW APPROACH TO DRIVER EFFICIENCY AND TRANSPORT SAFETY. SAE Transactions, 1954, 62, 335-345. (Harvard School of Public Health, Boston, Mass.).

This paper describes the Harvard School of Public Health research program concerning the human factors in vehicle design and operation. The promising areas of investigation are 1) job and activity analysis including the study of near accidents, 2) health maintenance examination, 3) detection of the accident repeater, 4) personal adjustments, 5) morale, 6) supervision and leadership, 7) human body size and capabilities with reference to the design and layout of all controls, instruments, seats, and areas of vision within the cab, 8) the effect of physical

variables on the driver such as noise, vibration, temperature, etc., and 9) safety features to protect the driver if an accident occurs. T. G. I. R 8

14,806

Nordlie, P.G. METHODOLOGY FOR ANALYSIS OF MAN'S ROLE IN AN ADVANCED SPACE FLIGHT SYSTEM. Contract NONR 2525 (00), Rep. 5, HSR RM 59/25 SM, Nov. 1959, 13pp. Human Sciences Research, Inc., Arlington, Va.

This report is part of a feasibility and design study of a manned space flight system. The methodology used in the development of requirements for design of displays and controls for the cockpit of the space flight vehicle is described. The specific methodology described includes 1) phase/function analysis, man-machine allocation, second-by-second operational analysis, pilot work load analysis, link analysis, and use/frequency analysis. R 9

14,807

McGrath, J.E. & Nordlie, P.G. RESEARCH METHODOLOGY OF REQUIREMENT-SETTING STUDIES. Contract NONR 2525 (00), Rep. 3, HSR RM 59/23 SM, Nov. 1959, 39pp. Human Sciences Research, Inc., Arlington, Va.

This report is one of a series of studies on system research methodology. The results of a review of the methods employed in some 50 system studies aimed at establishing various types of requirements for complex man-machine systems are presented. The review is focused on the applicability of available methods for establishing human performance requirements for complex, future weapon systems. Included are description and discussion of steps for conducting requirements studies, and a bibliography of the system studies covered in the review. R 49

14,808

McGrath, J.E., Nordlie, P.G. & Vaughan, W.S., Jr. A SYSTEMATIC FRAMEWORK FOR COMPARISON OF SYSTEM RESEARCH METHODS. Contract NONR 2525 (00), Rep. 1, HSR TN 59/7 SM, Nov. 1959, 65pp. Human Sciences Research, Inc., Arlington, Va.

This is the first report of a research program aimed at synthesis of system research methodology. The purposes of the research are discussed. Certain basic methodological concepts are presented which provide a basis for systematic description and analysis of the system research process. These concepts are developed into a framework for classification and comparison of methods used to accomplish different portions of a total system research problem.

14,809

A selected list of studies and methodological reports that most influenced the concepts presented in this study is included.
T. I. R 50

14,809

Robinson, J. E., Jr. HUMAN ENGINEERING TESTS OF SELECTED AIRCRAFT ANTI-COLLISION LIGHT SYSTEMS. Contract NOAS 57 541 C & NOAS 59 6008, July 1959, 194pp. Applied Psychology Corporation, Arlington, Va.

This report describes a human engineering investigation and evaluation of aircraft exterior light systems to determine their relative value as warning and direction-indicating devices. Both ground and flight tests were used with procedures designed to yield quantitative data relevant to the human factors involved. Fifteen observers participated in the tests; ground test problems totaled 5184 and flight test problems totaled 925. Conspicuity was quantified from search time measurements, and direction-indicating capabilities from directional response time and accuracy. The findings are discussed in relation to urgent research problems in this area. T. G. I. R 22

14,810

Steinkamp, G. R., Hawkins, W. R., Hauty, G. T., Burwell, R. R., et al. HUMAN EXPERIMENTATION IN THE SPACE CABIN SIMULATOR. DEVELOPMENT OF LIFE SUPPORT SYSTEMS AND RESULTS OF INITIAL SEVEN-DAY FLIGHTS. Rep. 59 101, Aug. 1959, 88pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

The first of a series of reports on seven-day simulated space flights being conducted to determine the biomedical requirements for manned space flights is described. The small space cabin simulator and its involvement is described; the protocol of experimental design is discussed; and pre-testing and post-testing methods are presented. Results of a study of five subjects committed to seven-day periods in this small cabin and on a four to four work-rest schedule are shown and discussed from the standpoint of the physiologic, psychophysiologic, and nutritional implications.
T. G. I. R 5

14,811

Schreiber, A. L. MONTE CARLO METHODS AS TOOLS FOR SYSTEM RESEARCH. Contract NONR 2525 (00), Rep. 7, HSR RM 59/27 SM, Nov. 1959, 19pp. Human Sciences Research, Inc., Arlington, Va.

The class of research methods denoted by Monte Carlo techniques is described. The applicability of these techniques within the systems research process, the conditions under which they can be utilized, and the

kinds of results that they provide are discussed. A selected bibliography of studies that utilize Monte Carlo methods is included.
R 13

14,813

Robinson, J. P. LINEAR PROGRAMMING AS A TOOL FOR SYSTEM RESEARCH. Contract NONR 2525 (00), Rep. 8, HSR RM 59/28 SM, Nov. 1959, 16pp. Human Sciences Research, Inc. Arlington, Va.

The major features of linear programming, one important class of analysis techniques, are summarized and ways in which these methods can be utilized in systems research are treated. The treatment focuses on the kinds of problems to which linear programming methods can be applied, the conditions necessary for their application, and the kinds of solutions which they can provide. Mathematical basis and computational procedures are treated only when essential to exposition. R 17

14,814

USA Quartermaster Research & Engineering Command. THE GUIDED MISSILE PROTECTIVE CLOTHING RESEARCH AND DEVELOPMENT PROGRAM OF THE DEPARTMENT OF THE ARMY. FOURTH ANNUAL REPORT. July 1959, 17pp. USA Quartermaster Research & Engineering Command, Natick, Mass.

This report covers work accomplished in providing specialized protective clothing for supporting crews in missile operations. The following significant accomplishments are described: (1) the new concept of Full and Limited Protective Clothing, its development and user testing; (2) progress in the development of an integrated, liquid air-cooled, full protection ensemble; (3) development and evaluation of an experimental permeable coverall for protection against liquid oxygen and hydrogen and (4) coordination with other branches of the service. R 25

14,815

University of Chicago. THE UNIVERSITY OF CHICAGO USAF RADIATION LABORATORY QUARTERLY PROGRESS REPORT. Contract AF 41(657) 252, Quart. Prog. Rep. 30, Jan. 1959, 126pp. USAF Radiation Lab., University of Chicago, Chicago, Ill.

This report presents work accomplished on a research program on certain biological and medical aspects of atomic energy. Three studies are reported in the area of pharmacological and toxicological compounds as protective or therapeutic agents against radiation injury in experimental animals; three are reported on the effects of ionizing radiations on the biochemistry of mammalian tissues; and two are given on the influence of exposure to low levels of gamma and fast neutron irradiation on the life span of mice.
T. G. R 123

14,816

Hopkin, V. D. PREFERRED LOAD AND POSITION FOR A HOOD JETTISON HANDLE. FPRC 992, April 1959, 4pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

To find the preferred position of a firing handle for jettisoning the canopy of an aircraft and to investigate various aspects of the loads for restraining the handle, 15 male subjects were tested. The task was to pull a D-shaped handle through various lengths (zero to nine inches) to activate a firing mechanism. The variables, in addition to length of pull, were load (35 to 105 pounds), position of handle relative to body, and direction of pull. Preferences of the subjects were analyzed and recommendations made. T.

14,817

Jackson, R. O., Swanseen, H. W., Way, W., Lach, W. J., et al. THE AIR TRAFFIC CONTROL PROBLEM AS IT EXISTS IN THE LAKENHEATH (ENGLAND) MILITARY CONTROL AREA. Contract AF 19(604) 2272, AFCRC TR 59 120(II), Air Traffic Series 2, Nov. 1958, 418pp. Tasker Instruments Corporation, North Hollywood, Calif.

This report was a thorough system analysis of the air traffic control operation at a military control area in order to define the problems, its phases, and related factors. The facilities were described and rules, procedures, patterns and approach/holding fixes were evaluated. The accuracy and reliability of air traffic control data functions and equipment were investigated. T. G. 1. R 100

14,818

Jackson, R. O., Swanseen, H. W., Way, W., Lach, W. J., et al. THE AIR TRAFFIC CONTROL PROBLEM AS IT EXISTS IN THE OLATHE (KANSAS) CONTROL AREA. Contract AF 19(604) 2272, AFCRC TR 59 120(III), Air Traffic Series 3, Nov. 1958, 400pp. Tasker Instruments Corporation, North Hollywood, Calif.

This volume reports a detailed study of the air traffic control problem as it exists in the Olathe Control Area. The Air Traffic Control facilities were described, and procedures, patterns, air route structure and reporting/holding fixes were evaluated. Climatological data were given; standard operating procedures were itemized; performance characteristics of aircraft operating in the area, and nature of the air movements were analyzed. It was intended that the report would aid systems designers and operations analysts in optimizing systems operation. T. G. 1. R 92

14,819

Guignard, J. C. THE PHYSICAL RESPONSE OF SEATED MEN TO LOW-FREQUENCY VERTICAL VIBRATION SOME PRELIMINARY STUDIES. FPRC 1062, April 1959, 10pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

To investigate human response to whole-body vibration within a limited band of vibration frequency, vertical sinusoidal vibration was applied to ten male subjects in a standardized sitting position, at frequencies from seven to 60 cps. and accelerations up to one g. Transmissibility, which was defined in the experiments as the ratio of the peak vibration acceleration recorded at the part of the body concerned to that recorded from the reference accelerometer, was measured at the hip and shoulder. Subjective reactions were also noted. Observations were made on the effect of tensing of the body, of discomfort, speech effects, vision, and maintenance of posture. T. G. 1. R 27

14,820

Agmon, S., Netanyahu, E., Grunbaum, D., Jakimovski, A., et al. RESEARCH IN THE AREA OF MATHEMATICAL ANALYSIS TECHNICAL FINAL REPORT. PERIOD: 1 JULY 1957 - 30 SEPTEMBER 1958. Contract AF 61(052) 04, AFOSR TR 58 111 (Part 2), Dec. 1958, 33pp. Dept. of Mathematics, Hebrew University, Jerusalem, Israel.

This is a final technical report of a research project covering various topics in the area of mathematical analysis; seven previous reports have been issued. Included are studies on the coerciveness problem for integro-differential forms, some aspects of extension problem for linear operators in Bausch spaces, problems of Tauberian character, some special methods of summability, and problems in conformal map making and in function theory. R 11

14,821

Blackwell, H. R. & Blackwell, O. M. LUMINOSITY FUNCTIONS OBTAINED WITH DIFFERENT METHODS AND DIFFERENT VIEWING CONDITIONS. Proj. MICHIGAN, Rep. 2144 344 T, Jan. 1959, 30pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

A series of measurements of the human luminosity function made with a variety of methods and under a variety of viewing conditions is summarized. The methodological variants were: 1) method used to arrive at brightness equation; 2) number and spectral composition of the standard radiance used; 3) configuration of the field of the photometric comparator; and 4) direct heterochromatic comparisons versus flicker

14,822

photometry. A standard measurement procedure was used for one and three degree comparison fields and at four levels of retinal illuminance. The obtained data were compared with CIE luminosity functions. G. I. R 3

14,822

Bullard, R. W. THE GASEOUS ENVIRONMENT AND TEMPERATURE REGULATION JUNE 1, 1958 - FEBRUARY 1, 1959. Contract DA 49 007 MD 947, March 1959, 43pp. Indiana University School of Medicine, Indianapolis, Ind.

To study the effects of oxygen deficiency and carbon dioxide excess upon responses involved in mammalian temperature regulation, a series of experiments was conducted. Nude men were exposed to five degrees C ambient temperature for 70-minute periods. At selected times the subjects breathed air rich in carbon dioxide or low in oxygen for 10, 20, or 30-minute periods. Shivering responses, metabolism and body temperatures were recorded and analyzed in relation to the change in gaseous environment. Rats and ground squirrels were exposed to a greater degree of oxygen deficiency in an altitude chamber. Characteristics of the cooling curves are discussed and the physiological mechanisms involved are described. T. G. R 27

14,823

Burke, R. O. A PRELIMINARY EVALUATION OF THE LINK VISUAL LANDING SYSTEM MARK IV. M.S. Thesis, Jan. 1959, 141pp. University of Wyoming, Laramie, Wyo.

To evaluate a jet transition simulator utilizing the Link Visual Landing System Mark IV, the attitudes of a group of pilots undergoing a transition training course in which this device is used and their opinions as to its effectiveness were investigated. Questionnaires, listing those normal and emergency procedures which were possible to present in the simulator, were given to 41 trainees and 22 staff training personnel. The instructions were to indicate the items he thought most beneficial and also those least beneficial. These ratings were analyzed by frequency tabulations as well as a percentage score. Several chapters of the report are devoted to discussions of flight training devices in general, a description of the visual landing system, and development of simulator training programs. T. I. R 45

14,824

Burrows, A. A. AN ANGLE OF INCIDENCE INDICATOR USING BOTH AUDITORY AND VISUAL DISPLAY. FPRC 1025, Dec. 1957, 19pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

A pressure ratio device using both auditory and visual display was assessed as an aid to aircraft landing. Both land-based tests and aircraft carrier tests were carried out to check the reliability and accuracy of the indicator. The indicator yields stall warning over wide ranges, best landing speed, sensing optimum lift to drag ratios in long distance, intercepting aircraft where fuel is important, and thrust and similar measurement in jet engines. T. G. I. R 4

14,825

Crook, M. N. & Gray, Florence E. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: FORM COMPLEXITY AND RECOGNITION. Contract DA 49 007 MD 536, Interim Rep. 9, Jan. 1959, 5pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

The relation between complexity of irregular geometrical forms and ability to classify the forms as having been seen, or not seen in a preliminary familiarization routine was investigated. Complexity was measured in terms of the number of sides (4, 8, 12, 16, 20). Ten subjects were tested individually by being shown 40 forms, singly for ten seconds, and then attempting to identify these 40 forms on a test sheet containing 200 forms. Results were expressed as number (or per cent) of judgments correct. G.

14,826

Crook, M. N. PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. Contract DA 49 007 MD 536, Interim Rep. 4, March 1956, 3pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

Progress since the Annual Report of October 1955 is summarized, including further analyses of data from two experiments on irregular forms, an experiment in progress designed to provide both time and error scores on the effect of natural versus unnatural brightness relation between figure and ground, work on a technique for producing irregular forms with curved contours, and preparations for subsequent steps in the program.

14,827

Cope, F. W. PROBLEMS IN HUMAN VIBRATION ENGINEERING. Proj. NM 18 01 12.4, Rep. 2, NADC MA 5902, March 1959, 14pp. USN Aviation Medical Acceleration Lab., Naval Air Development Center, Penn.

The effects of whole body vibration on the human operator of vehicles and methods of prevention are discussed in this paper. The first section is devoted to the ways in

which vibration is transmitted from vehicle to man and to methods of preventing such transmission. That portion of the vibration which reaches the man can cause a variety of anatomical, physiological, and performance changes which are discussed in the second section. Finally, an effort is made to relate experimental findings to practical problems. Some practical methods and equipment for vibration protection are described. G. I. R 19

14,828

Crook, M. N. & Weisz, A. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. A PRELIMINARY EXPERIMENT. Contract DA 49 007 MD 536, Interim Rep. 1, Dec. 1954, 8pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

A preliminary experiment is described which served the double purpose of testing a technique for producing simulated noise in visual displays and of classifying a group of familiar forms in terms of relative recognizability. The simulated noise technique is described in some detail. G. I.

14,829

Crook, M. N., Bishop, H. P., Gray, Florence E., Hanson, J. A., et al. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: IRREGULAR FORMS VIEWED AGAINST PLAIN AND COMPLEX BACKGROUNDS IN FACSIMILE COPY. Contract DA 49 007 MD 536, Interim Rep. 5, Sept. 1956, 14pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

A method for generating unfamiliar forms which are quantitative enough to modify in describable steps was presented in some detail. Two experiments using such forms and their modifications were carried out. The first served mainly to explore several different aspects of the problem of recognition of irregular forms. Form modification, signal/noise ratio, and polygon category were varied. In the second, complex backgrounds were added but the number of items in the other categories was reduced. Results were discussed in terms of the various dimensions. G. I.

14,830

Crook, M. N. & Jaffe, J. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: DIRECTION OF CONTRAST AS A FACTOR IN THE RECOGNITION OF FAMILIAR FORMS. Contract DA 49 007 MD 536, Interim Rep. 6, Oct. 1956, 10pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

To investigate the effect of natural versus unnatural brightness contrast directions on the recognizability of familiar forms under noise, 12 male students had to recognize each of 24 such forms (12 light, 12 dark) of three classes of difficulty presented in both contrast directions under each of four or five noise levels. After 12 practice trials on forms not used in the experiment, the subject was shown the eight forms of each difficulty group under each noise level, most severe level first. Recognition time was analyzed as a function of noise level and contrast direction. T.

14,831

Crook, M. N., Gray, Florence E., Hanson, J. A. & Weisz, A. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: A SET OF IRREGULAR FORMS. Contract DA 49 007 MD 536, Interim Rep. 10, Jan. 1959, 15pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

This report describes a general method of constructing irregular forms by two different techniques. In addition, necessary subsidiary rules are enumerated. The forms themselves are of two broad types—those bounded by straight lines, those bounded by curved and straight lines. For each type sets were constructed with 4, 8, 12, 16, and 20 sides. Each original form was modified in four progressive steps. All forms in these sets are illustrated. I. R 3

14,832

Geoghegan, B., Sargent, F., II & Sayer, Joyce. NUTRITIONAL OBSERVATIONS IN H. M. S. WAVE. RNP 59/954, CES 443, NP 9, March 1958, 39pp. Climatic Efficiency Sub-Committee, MRC, London, England.

To assess the effect of a cold environment on nutrition, an investigation was conducted on 53 members of the crew of H. M. S. WAVE. Five weeks were spent in a temperate climate (44 degrees to 49 degrees F) and six weeks in the Arctic (34 degrees to 41 degrees F). For 13 weeks records were maintained of food consumption and body weight. Venous blood and timed specimens of urine were collected before the cruise and after six weeks in the Arctic. The data were analyzed and discussed with reference to 1) caloric intake and exposure to cold, 2) cold exposure and metabolism of ascorbic acid, and 3) nutritional requirements in cold climates. T. R 35

14,833

Edwards, W. SUBJECTIVE PROBABILITY IN DECISION THEORIES. Rep. 2144 361 T, March 1959, 21pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

14,834

This report is concerned with theories which explain choices among risky alternative courses of action by means of the concept of utility, or subjective value, and subjective probability. The mathematical implications of subjective rather than objective probabilities are examined. It is concluded that the traditional form of the theory is more restrictive than has hitherto been supposed and is consequently inconsistent with existing data. A more flexible form of the theory is developed, and an experiment to test its validity is outlined. G. R 26

14,834

DuBois, P. H. & Gold, D. SOME REQUIREMENTS FOR QUANTITATIVE METHODS IN BEHAVIORAL SCIENCE RESEARCH. AFOSR TN 58 1104, ca. 1958, 41pp. Washington University, St. Louis, Mo.

Some requirements for quantitative methods of analysis in behavioral research are discussed in relation to the order of measurement which characterizes the data. A technique is developed for dealing with three (or more) categorical variables which will provide some of the kinds of answers obtainable when one or more of the variables involve interval measurement. Two primary problems of interest to the behavioral scientist when dealing with interval data are discussed: 1) the development of means of identifying unitary variables manifested in diverse acts of behavior by groups of individuals, and 2) the application of factor analytic techniques in the determination of the basic variables underlying a set of observed variables. R 6

14,835

Crook, M. N. & Coules, J. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: FAMILIARITY AND RECOGNITION OF IRREGULAR FORMS. Contract DA 49 007 MD 536, Interim Rep. 8, Jan. 1959, 14pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

To investigate the effects of varieties of experience with irregular (unfamiliar) forms on the familiarization process and of degree of familiarity as a factor in the recognition of forms in degraded copy, a series of five experiments were conducted. Irregular geometric test forms constructed by a randomization method were used throughout; three sets were used for familiarization and one for recognition. Several sorting techniques and one reproduction technique were used with different frequencies for familiarization with a final familiarity rating and, in some cases, recognition under noise being obtained. T. G. I. R 3

14,836

Crook, M. N. & Coules, J. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: REDUCED CONTRAST AND CONTOUR DEGRADATION AS FACTORS IN IMPAIRMENT OF FORM RECOGNITION. Contract DA 49 007 MD 536, Interim Rep. 7, Jan. 1959, 7pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

To investigate the differential effect of reduced contrast and contour degradation on form recognition in noisy copy, test sheets of Landolt rings were prepared in three sizes. These sheets were reproduced at various noise levels (contour degradation) and printing current ranges (contrasts). The subject's task was to judge the position of the gap in each ring. Results were expressed as mean percentages of items correct at the several combinations of noise level, printing current range, and ring size. A small-scale check test was made using "familiar" forms (silhouettes of known objects). T. G.

14,837

Gogel, W. C. THE PERCEPTION OF SPACE WITH BINOCULAR DISPARITY CUES. Proj. 6 95 20 001, Task USAMRL T 2, MEDEA. Rep. 379, April 1959, 24pp. USA Medical Research Lab., Fort Knox, Ky.

This paper summarizes an approach to the understanding of the perception of space when the depth component is supported only by binocular cues. This theoretical approach emphasizes the perceptual interrelation of frontal and depth extents. Equations expressing the application of this position have been developed for the perception of the depth resulting from a binocular disparity and for perception of three-dimensional shape. Experimental data relating to these equations are reviewed. Implications of this approach are discussed with regard to the perceptual consequences of base and optical magnification. T. G. I. R 18

14,838

Wolcott, C. F., Hart, T. J. & Raine, L. R. SIXTH INTERIM DEVELOPMENT REPORT FOR MULTICOLOR PLAN POSITION INDICATOR FOR USE IN THE AIR TRAFFIC CONTROL RADAR SAFETY BEACON SYSTEM. Contract NOBSR 72571, Index NEO 10234, June 1957, 25pp. Gilfillan Bros. Inc., Los Angeles, Calif.

The long-range objective of this research is to provide a radar Plan Position Indicator on which pulse coded beacon returns can be displayed in seven color hues depending on the code-to-color assignment. This report covers progress during the period 1 April 1957 through 31 May 1957.

14-232

42 233

Two special tri-color long-persistence phosphor Chromatrons were received and tested, and circuitry problems received attention. Final design values have been established. T. 1.

14,839

Wolcott, C. F., Hart, T. J. & Raine, L. R. SEVENTH INTERIM DEVELOPMENT REPORT FOR MULTICOLOR PLAN POSITION INDICATOR FOR USE IN THE AIR TRAFFIC CONTROL RADAR SAFETY BEACON SYSTEM. Contract NOBSR 72571, Index NEO 10234, Aug. 1957, 8pp. Gilfillan Bros. Inc., Los Angeles, Calif.

The long-range objective of this research is to provide a radar Plan Position Indicator on which pulse coded beacon returns can be displayed in seven color hues depending on the code to color assignment. This report covers the activities during the period 1 June 1957 through 31 July 1957. T.

14,840

Godshall, J. C. UNDERWATER ESCAPE PROGRAM F4D-1 CANOPY LOAD AND HUMAN EGRESS TESTS ABOARD A SUBMARINE. INTERIM REPORT NO. 5. BuAer TED Proj. ADC AB 6307, Rep. NADC ED 5839, March 1959, 24pp. USN Engineering Development Department, Navy Air Development Center, Penn.

Preliminary tests for underwater egress from an F4D-1 cockpit section installed on a fleet-type submarine at New London, Connecticut, during July 1958 are described in this report. Pilot egress problems are discussed, including the waterflow effect which tends to close the canopy. It is recommended that certain further tests be conducted at higher sink rates to obtain additional information using both the single-place fighter cockpit, F4D-1, and a two-place trainer cockpit, T2V-1. T. G. 1.

14,841

Gaito, J. HUMAN ENGINEERING INVESTIGATIONS OF AIRCRAFT COCKPIT VISUAL DISPLAYS. PART 20. THE RELATIONSHIP BETWEEN PHYSICAL AND APPARENT BRIGHTNESS FOR THREE DEGREES OF INSTRUMENT BACKGROUND HETEROGENEITY. Proj. TED NAM AE 7047, Rep. NAMC ACEL 388, March 1959, 9pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

To investigate the relationship between physical and apparent brightness as a function of degree of background heterogeneity, three experiments were conducted using the method of average error. Background heterogeneity was provided by arranging nine airspeed indicators in a three-by-three matrix on a black panel which was angled 25 degrees from vertical so that the centermost dial face was normal to the direct line of

vision. In experiments (1) and (2), the subject equated each instrument singly with the center one and voltage was recorded. Then he equated each instrument with every other one when the lights for the nine instruments were on. In the last experiment, brightness readings rather than voltages were made. T. G. R 7

14,842

USAF School of Aviation Medicine. BIOASTRONAUTICS ADVANCES IN RESEARCH, March 1959, 181pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

Fifteen special progress reports are published in this report, all of which deal with medical and biological problems immediately applicable in rocket and satellite flight. The reports include 1) definitions and sub-divisions of space (bioastronautical aspect), 2) instrumentation and biomedical research, 3) primates in space, 4) man in space, 5) closed ecological systems, 6) physiologic instrumentation of man during flight, 7) survival of terrestrial microorganisms under simulated Martian conditions, and 8) center of gravity and moments of inertia measurements for seat (plus rhesus monkey). T. G. 1. R 40 (approx.)

14,843

USN Research Laboratory. THE EFFECTS OF TASK INDUCED STRESS ON MAN-MACHINE PERFORMANCE. Projs. NR 401 000 & NR 401 002, Aug. 1957, 11pp. USN Research Lab., Washington, D. C.

Experiment 1 compared performance on two man-machine systems, acceleration control and acceleration-aided control, under normal and stress conditions. Experiment 2 compared the same systems under the same conditions; however, the poorest operators were assigned to the human-engineered system (acceleration-aided), the best to the other. Experiment 3 compared the acceleration and position control under the same conditions; however, the operators had been extensively trained. There were 16 subjects per experiment, and seven task-induced stress conditions, e.g. secondary arithmetic task, prolonged trials. T. G. 1. R 7

14,844

Rand Corporation. AN ANNOTATED BIBLIOGRAPHY OF RAND SPACE FLIGHT PUBLICATIONS. Rev. RM 2113 1, March 1959, 53pp. Rand Corporation, Santa Monica, Calif.

This annotated bibliography is a list of RAND reports on astronautics and space exploration which are currently available to military, industrial and commercial organizations with "need-to-know". Also a list of libraries where the publications may be found is included. R 200 (approx.)

14,846

14,846

Newton, J. M., Meketon, M., Roote, J. & Stargel, R. AN INVESTIGATION OF TRACKING PERFORMANCE IN THE COLD WITH TWO TYPES OF CONTROLS. Proj. 6 95 20 001, Subtask USAMRL S 4, MEDEA, Rep. 324, Sept. 1957, 13pp. USA Medical Research Lab., Fort Knox, Ky.

To determine the effect of low ambient temperature on movement-tracking and pressure-tracking, 12 subjects performed these tasks under six temperature conditions: 24, 0, -5, -10, -15, and -20 degrees C. Each subject had two experimental sessions per temperature condition; one on each type of control. Number and duration of errors were scored. These data were subjected to analysis of variance. T. G. I. R 3

14,847

Maclay, H. A DESCRIPTIVE THEORY OF COMMUNICATION. Contract AF49(638) 33, AFOSR TN 58 1112, Aug. 1958, 55pp. University of Illinois, Urbana, Ill.

A descriptive theory of the process of communication is presented. Communicative behavior is defined and three levels of communication are discussed. An experimental design for studying such behavior is presented next. The units of this behavior are defined in terms of three classes of variables and their interrelations are discussed. Finally, several problem areas are described in terms of these variables. R 4

14,848

Miller, E. F., II. THE ELIMINATION OF HEADACHE, NAUSEA, AND DIZZINESS, REPORTED BY A STUDENT PILOT DURING INSTRUMENT FLIGHT STAGE BY MEANS OF REMEDIAL VISUAL TRAINING A CASE STUDY. PART I. TRAINING PERIOD. PART II. ONE YEAR LATER. Spec. Rep. 57 29, Nov. 1957, 16pp. USN School of Aviation Medicine, Naval Air Station, Fla.

This case study describes a remedial visual training program for a student pilot who had frequent occurrences of dizziness, nausea and intense headache while flying on instruments. Three types of training were employed: tachistoscopic viewing of 4-, 5-, 6-, and 7-digit numbers; practice in maintaining fusion under diplopic conditions; and duction tests with Risley prisms. Before this training, measurements of lateral and vertical phorias, muscle balance, and ductions were made. These were compared with the same measurements taken during training. T. G. R 7

14,849

Mendelson, E. S. A SENSITIVE METHOD FOR REGISTRATION OF HUMAN INTRATYMPANIC MUSCLE REFLEXES. Proj. NM 13 01 13 3, Rep. NAMC ACEL

368, Feb. 1958, 4pp. USN Air Crew Equipment Lab., Naval Air Material Center, Penn. (Reprinted from: J. appl. Physiol., Nov. 1957, 11(3), 499-502).

By tympanomanometry, the intratympanic muscle reflexes of 25 subjects were measured for tones of 400-6000 cps at levels of 80-115 db. Each tone was presented several times. Latency, size and direction of pressure were observed. The primary aim of this report was to detail the method of recording. T. G. R 13

14,851

Reza, F. M. & Jutila, S. SYSTEM RELIABILITY STUDIES. FINAL ENGINEERING REPORT. Contract AF30(602) 1675, RADCR 59 24 & Rep. EE393 56121, Dec. 1958, 40pp. Electrical Engineering Dept., Syracuse University Research Institute, Syracuse, N. Y.

Theoretical studies were conducted in the field of reliability and probabilistic networks. The concept of h(p) functions is discussed; the Shannon-Moore expansion theorem is proved and an extension of it given; an additional theorem on necessary conditions for realizability of h(p) functions is presented; some formulae concerning the interrelationships of coefficients of reliability functions for series, parallel and composition of networks have been developed; computations of these coefficients is also included. I. R 1

14,852

Siegel, A. I. & Wolf, J. J. TECHNIQUES FOR EVALUATING OPERATOR LOADING IN MAN-MACHINE SYSTEMS A DESCRIPTION OF A MODEL AND THE RESULTS OF ITS FIRST APPLICATION. Contract NONR 2492(00), Feb. 1959, 96pp. Applied Psychological Services, Wayne, Penn.

A model is developed which may yield improved analysis and prediction of the effectiveness of man-machine systems. It incorporates considerations of intra- and inter-individual differences, individual stress tolerance, effect of stress upon response time and decision making time. Thus, it reasonably agrees with currently accepted thinking regarding human behavior. The model was applied to the pilot's task of landing an F4D aircraft on a carrier. The predictions are presented and evaluated. T. G. I. R 12

14,853

Sparke, J. W. METHODS OF INDICATING A GLIDE PATH BY VISUAL MEANS. U. D. C. 656 713 985 661, Tech. Note EL 160, Dec. 1958, 28pp. Royal Aircraft Establishment, Farnborough, Hants, England.

The main requirements for an effective visual glide path indicator system are defined. The information which it would be required to transmit is discussed in some detail along

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14,863

with ways of coding the visual signals. Recent developments in such systems are described, e.g. three-colour sector light system, double bar ground aid, and one is proposed as meeting the requirements most satisfactorily. G. I. R 4

14,855

Stone, P. T. & Corkindale, K. G. SOME FACTORS AFFECTING THE EFFICIENCY OF VISION AT NIGHT. Rep. 88, Oct. 1957, 19pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

This summary of dark adaptation phenomena gathered from the literature brings together factors which must be considered for maintaining optimum night vision. The physiological mechanisms of adaptation are first reviewed. The characteristics of the stimulus situation, e.g., intensity and wavelength of previous light, retinal location; and of the individual, e.g., oxygen, age, alcohol, which influence light sensitivity are outlined and briefly discussed. Recommendations allowing for optimum night visual performance are presented. G. I. R 50

14,857

Stevens, S. S. ADAPTATION LEVEL VS. THE RELATIVITY OF JUDGMENT. Amer. J. Psychol., Dec. 1958, LXXI, 633-646. (Harvard University, Cambridge, Mass.).

This paper distinguishes between the processes, sensory adaptation and judgmental relativity, and suggests that the theory of "adaptation-level" tends not to keep them separate. In particular, certain questionable assumptions in this quantified theory are indicated, and an attempt is made to show that it is not a good model of the judgmental process. In addition, this theory was shown not to fit the results of category-scaling. The author then proposes the theory of judgmental relativity and its two classes of psychological continua. G. R 44

14,858

Townsend, F. M. & Stenbridge, V. A. MODERN CONCEPTS IN INVESTIGATION - AIRCRAFT FATALITIES. J. forensic Sci., Oct. 1958, 3(4), 381-400. (Armed Forces Institute of Pathology, Washington, D. C.).

Modern concepts in the investigation of aircraft fatalities are discussed. Primarily the fatalities are evaluated through consideration of environmental conditions--altitude, speed, toxins, temperature, noise and stress, traumatic factors--protective equipment, escape, aircraft design, and pre-existing disease. Representative cases are presented and analyzed. R 15

14,861

Zegers, R. T. PHOTOSENSITIZATION IN RELATION TO MEAN AND STANDARD

DEVIATION VALUES. Psychol. Monogr., 1959, 73(11), 1-25, No. 481. (Fordham University, New York, N. Y.).

The research described was undertaken to determine whether the human eye undergoes a process of photosensitization when it operates at low levels of illumination. Seven related topics are treated. Part 1 deals with the photopic luminosity curves of four subjects demonstrating the normalcy of their color vision. Part 2 reports the data obtained from the investigation of photosensitization (differential threshold for foveal vision at low background levels). The next five parts treat the investigation of the variability of the standard deviation 1) with wavelength, 2) under fixed conditions of field size and method at a few wavelengths, and 3) with field size. Quantum estimates of the mean values of these data are presented. T. G. I. R 17

14,862

Buchheim, R. W. (Dir.). SPACE HANDBOOK: ASTRONAUTICS AND ITS APPLICATIONS, STAFF REPORT OF THE SELECT COMMITTEE ON ASTRONAUTICS AND SPACE EXPLORATION. House Doc. 86, 1959, 252pp. US Government Printing Office, Washington, D. C. (Rand Corporation, Santa Monica, Calif.).

This Space Handbook consists of four parts: 1) introduction with historical notes, a discussion of the general nature of astronautics, current state of space technology and action considerations; 2) technology of space environment, trajectories and orbits, rocket vehicles, propulsion systems, propellants, internal power sources, structures and materials, flight path and orientation control, guidance, communications, observation and tracking, atmosphere flight, landing and recovery, environment of manned systems, space stations and extraterrestrial bases, nuclear weapon effects and space, cost factors and ground facilities; 3) applications; and 4) astronautics in other countries. T. G. I. R 400 (approx.)

14,863

McCormack, J. W. (Chm.). THE NEXT TEN YEARS IN SPACE, 1959-1969, STAFF REPORT OF THE SELECT COMMITTEE ON ASTRONAUTICS AND SPACE EXPLORATION. House Doc. 115, 1959, 221pp. US Government Printing Office, Washington, D. C.

This report consists of a summary of commentary from men and institutions on what they see in the future for space development, and particularly what scientific progress they think may evolve in the next ten years. Specific parts of the summary cover the moon, Mars and Venus, man in space, space stations and controlled flight, other uses of space, propulsion the key to space travel, long-term speculations, and space policy for the future. The second part of the

14,864

report includes the full text of the statements received (approximately 50). T. G. I.

14,864

Glaser, E. M. & McCance, R. A. COMPARISON OF HYOSCINE HYDROBROMIDE WITH SOME NEWER PREVENTIVES FOR MOTION SICKNESS. RNP 59/951, SS 91, Feb. 1959, 6pp. Survival-at-Sea Sub-Committee, RNPRC, London, England.

A controlled experiment was carried out with Army volunteers, using Naval life-rafts and artificial waves, to compare the merits of various motion-sickness remedies (hyoscine hydrobromide, cyclizine hydrochloride, meclizine hydrochloride, and perphenazine). The motion was fairly severe and lasted for one hour. Each subject (72 in all) received each of six treatments (no drug and no lactose dummy, lactose dummy, and each of the above drugs) at 48 hour intervals. Incidence of vomiting or retching was recorded by observers, and other symptoms were reported by the subjects on questionnaires within ten minutes of the end of each test. The data were analyzed for the treatment producing the fewest symptoms of motion sickness. T. R 8

14,955

Culver, Wave E. EFFECTS OF COLD ON MAN. AN ANNOTATED BIBLIOGRAPHY, 1938-1951. SUPPLEMENT NO. 3. Physiol. Revs., Oct. 1959, (Part II), 39(Suppl. 3), 524pp.

This bibliography gives a comprehensive coverage of the literature from 1938 through 1951 on the physiological effects of cold on man and prophylactic methods of dealing with the various cold injuries, especially frostbite, immersion foot, and trench foot. It includes the effects of cold on various warm-blooded animals used in experimental laboratories and in other studies simulating conditions of human existence. The references are from a wide range of physiological, medical, and other scientific journals and monographs. Each reference is accompanied by an informative annotation. Only translated titles of works written in languages other than English are included. The references are arranged alphabetically by author within a detailed subject classification. R 2736

14,866

General Dynamics Corp. ELECTRIC BOAT DIVISION: HUMAN FACTORS BIBLIOGRAPHY. April 1959, 3pp. Electric Boat Div., General Dynamics Corp., Groton, Conn.

This human factors bibliography contains references to studies on submarines, weapon and tactical control, ship control, decision making, monitoring, effects of stressful environment, and training device research. The papers are listed chronologically under each subject matter topic

and cover a period from mid 1956 to the early part of 1959. R 33

14,867

Hatch, R. S. AN EVALUATION OF THE EFFECTIVENESS OF A SELF-TUTORING APPROACH APPLIED TO PILOT TRAINING. Proj. 1710, Task 77535, WADC TR 59 320, July 1959, 19pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

The problem of insuring ready recall of a large body of in-flight job information by Air Force pilots was explored. The effectiveness of a voluntary self-tutoring approach using one type of "game appeal" device was investigated. Two matched groups of pilots were pre-tested on their knowledge of instrument flying information. The device was installed in the crew lounge of one of the groups but not in the other. After a two-month period both groups were tested again. Performance of the two groups was compared. Factors pertinent to the interpretation of the results and implications for further research were discussed. T. G. 1. R 4

14,868

Hopkin, V. D. A SELECTIVE REVIEW OF PERIPHERAL VISION. FPRC 1078, June 1959, 16pp. Flying Personnel Research Committee, MRC, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England.).

A selective survey of the literature on peripheral vision and its functions is presented. The primary concern that initiated the survey was a proposal to use a Peripheral Vision Display in the airplane cockpit. The review is organized around the following topics: 1) developments from early theoretical work, 2) early applied work in aviation, 3) visual and postural cues in balance, 4) the peripheral field during forward motion: applications to landing, 5) scanning and peripheral vision, and 6) some visual characteristics of the periphery. R 129

14,869

Caldwell, Anne E. PSYCHOPHARMACA A BIBLIOGRAPHY OF PSYCHOPHARMACOLOGY. 1952-1957. Bibliography Series 19, Service Publ. 581, 1958, 258pp. US Dept. of Health, Education, and Welfare, Washington, D. C.

This bibliography on psychopharmacology covers the period between January 1952 and December 1956 and extends into 1957. It includes articles concerned with the effect of psychopharmacologic agents on the psychologic, behavioral and encephalographic reactions of normals, patients, and laboratory animals. It also contains a drug index, subject list of drugs, ancillary subject list of special conditions, e. g., aged, and an author list. R 2500 (approx.)

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14, 876

14, 870

Bennett, P. B. & Glass, A. THE ELECTROENCEPHALOGRAPH AND NARCOSIS UNDER HIGH PARTIAL PRESSURES OF NITROGEN AND ISONARCOTIC CONCENTRATIONS OF NITROUS OXIDE. RNP 59/937, UPS 170, RNPL 11/57, Dec. 1957, 29pp. Underwater Physiology Subcommittee, RNPRC, London. (Royal Naval Physiological Lab., MRC, Alverstoke, Hants, England.).

To investigate the problem of narcosis induced in divers breathing compressed air, a series of experiments on human and animal subjects were conducted. Electroencephalograms were recorded on men and on animals at various simulated depths (up to 300 feet of sea water) in a pressure chamber, together with psychological tests (multiplication tests, cross-out tests) to ascertain the degree of narcosis induced. Similar experiments involved the breathing of isonarcotic concentrations of nitrous oxide and of helium. Comparisons of electrical activity, of objective signs of mental impairment, and of subjective impressions of narcosis, were made between records taken at the surface with those at the simulated depths. T. G. I. R 36

14, 871

Coles, R. P. A. & Knight, J. J. AN AUDIOMETRIC SURVEY OF FLIGHT-DECK PERSONNEL OF H. M. S. SHIPS, ARK ROYAL AND EAGLE. RNP 59/950, HES 17, April 1959, 38pp. Hearing Sub-Committee, RNPRC, London, England.

To determine whether any deafness of flight deck men had resulted from current flying operations (jet aircraft) on the aircraft carriers, 224 aircraft carrier personnel were tested by pure tone audiometry after an average of three weeks' rest from aircraft noise. The hearing of 131 shore-based men was tested in establishing a control group. Each ear was examined clinically and a questionnaire completed in preparation for the audiometric tests which were made at eight frequencies (from 0.25 to 8 kilocycles per second). All hearing losses from causes other than aircraft-noise exposure were excluded, and the remaining subjects grouped in three grades of increasing noise exposure. These data were then compared with the control group for assessment of hearing loss due to aircraft-noise exposure. T. G. R 58

14, 872

McCance, R. A. REPORT TO THE ROYAL NAVAL PERSONNEL RESEARCH COMMITTEE ON THE ACTIVITIES OF THE SURVIVAL-AT-SEA SUB-COMMITTEE. RNP 59/947, SS 94, June 1959, 8pp. Royal Naval Personnel Research Center, MRC, London, England.

The work sponsored by the Survival-at-Sea Subcommittee over a period of ten years is reviewed. Reports issued to the Royal Naval Personnel Research Committee and publications in the scientific and medical press are listed in the appendix. The various aspects of the work described are 1) food and water requirements in life rafts, 2) prevention of motion sickness, 3) analysis of depositions of shipwreck survivors, 4) the effects of drinking salt water, 5) the effects of immersion in water, 6) miscellaneous problems, and 7) future studies. R 56

14, 873

Sequist, M. R. PERCEPTION OF THE STATISTICAL STRUCTURE OF GROUPED EVENTS. Jan. 1959, 56pp. University of Texas, Austin, Tex.

This study was concerned with the investigation of several aspects of statistical decision theory. Five general hypotheses concerning the ability of human subjects to perceive the underlying statistical structure of sequential events were tested. These hypotheses were derived from a pilot study and from the theory of statistical decision functions. The performance of two randomly assigned groups of 25 subjects each was compared on a questionnaire and two specially constructed sequences containing two discrete events. A mathematical criterion of accuracy was utilized for purposes of evaluation of performance. The implications of the findings for theories of decision making are discussed. T. G. R 42

14, 875

USN Physiological Psychology Branch, SECOND SYMPOSIUM ON PHYSIOLOGICAL PSYCHOLOGY, MARCH 19-21, 1958. ONR Symposium Rep. ACR 30, March 1959, 253pp. USN Physiological Psychology Branch, ONR, Washington, D. C.

This is a report of the second symposium representing the research program of the Physiological Psychology Branch of the Office of Naval Research. The 23 papers reproduced here represent such diverse fields as physiology, psychology, neuro-anatomy, psychophysics, psychoacoustics, and biochemistry. The papers were planned for and arranged in a definite functional sequence, beginning with research upon the nature of the stimulus and continuing through the appropriate sensory modality to the level of perception or integration with other systems. Each speaker presented his latest work and also suggested directions in which future research might be profitable. T. G. I. R 23

14, 876

Beidler, L. M. THE PHYSIOLOGICAL BASIS OF TASTE PSYCHOPHYSICS. From the Second Symposium on Physiological

14,877

Psychology, March 19-21, 1958, 1-11. USN Physiological Psychology Branch, ONR, Washington, D. C. (Florida State University, Tallahassee, Fla.).

A theory of the mechanism of taste receptor stimulation has been previously developed in detail and accounts for much of the quantitative data obtained from electrophysiological investigations of the taste responses of many different species of animals. This theory has now been applied to certain psychophysical properties of human taste sensations. Data concerning consecutive just noticeable differences (j.n.d.'s) of sodium chloride, saccharin, and sucrose have been used in the application of the basic taste equation. The results of the experimental data and predictions from theory are discussed in detail. The relation between this approach and that taken by Fechner and Stevens is discussed. T. G. 1.

14,877

Kenshalo, D. R. & Nafe, J. P. THRESHOLD OF THERMAL SENSATION. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 23-31. USN Physiological Psychology Branch, ONR, Washington, D. C. (Florida State University, Tallahassee, Fla.).

Thermal sensation has been neglected as a subject for study by both the psychophysiolgist and the electrophysiolgist largely because of lack of techniques for stimulus control. Methods of control, capable of controlling the stimulus to within $\pm 0.01^\circ\text{C}$ degrees of a predetermined point are discussed briefly. Curves of thermal sensitivity for both warm and cool between 26 degrees C and 40 degrees C are presented and discussed with respect to existing measures. G. I. R 2

14,878

Geldad, F. A. DEVELOPMENTS IN VIBRATORY COMMUNICATIONS. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 33-39. USN Physiological Psychology Branch, ONR, Washington, D. C. (University of Virginia, Charlottesville, Va.).

Three lines of recent progress in a vibratory research program are reported: 1) the systematic measurement of frequency discrimination (Δf), over its useful frequency range, for mechanical vibration; 2) the exploration of an important "derived" dimension of vibration--envelope shape or "attack"; and 3) identification of the crucial stimulus variable determining the shape of the frequency function for alternating current electrical stimulation of the skin. The bearing of all three on the more general problem of cutaneous communication is discussed, as is also the status of several stimulus dimensions which are, as yet, unexplored experimentally. G.

14,879

Stevens, J. C. & Stevens, S. S. THE GROWTH OF SUBJECTIVE MAGNITUDE WITH STIMULUS INTENSITY. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 41-49. USN Physiological Psychology Branch, ONR, Washington, D. C. (Harvard University, Cambridge, Mass.).

For a large class of perceptual continua, subjective magnitude grows as a power function of the physical level of the stimulus. This relation has been demonstrated by two methods: 1) magnitude estimation under which the observer assigns numbers proportional to the apparent magnitude of various stimuli; and 2) ratio production, under which observers set one stimulus to some prescribed apparent fraction or multiple of another stimulus. The continua apparently governed in this manner are discussed with appropriate supporting data and the exponents of the functions are presented. The validity of the methods and functions is further discussed. G.

14,880

Notterman, J. M. SOME PRELIMINARY PSYCHOPHYSICAL DATA CONCERNING TIME-VARIANT STIMULI. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 51-55. USN Physiological Psychology Branch, ONR, Washington, D. C. (Princeton University, Princeton, N. J.).

The research program, within which the present study was made, is an attempt to effect a closer relationship between behavior theory and servo system theory. The reported study is of interest in a servo system context because the continuous closed-loop model requires knowledge of the detecting characteristics of human organisms for inputs using combinations of initial stimulus magnitude plus the first and second time-derivatives of this magnitude. Whether the organism discriminates the derivatives or the time integral of these derivatives over an interval of time is being investigated. Preliminary data for judgments of loudness increase are presented for the first two subjects run. Details of the experimental conditions are given. G.

14,881

Plutchik, R. COMMENTS ON THE PROBLEM OF INDIVIDUAL DIFFERENCES IN PSYCHOPHYSIOLOGICAL RESEARCH. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 89-101. USN Physiological Psychology Branch, ONR, Washington, D. C. (Hofstra College, Hempstead, N. Y.).

This paper describes certain phenotypic aspects of individual differences, particularly with reference to stress studies, and notes some of the interpretations that have been offered to account for them.

239

14,889

Important lines of research are suggested on such broad questions as: 1) the methods to be used for analysis of data, 2) the diagnosis of behavior disorders, and 3) the development of a theory of emotion. G. I. R 29

14,883

Riggs, L. A. VISUAL EFFECTS OF MINIMAL EYE MOVEMENTS. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 123-135. USN Physiological Psychology Branch, ONR, Washington, D. C. (Brown University, Providence, R. I.).

The experiments reported are concerned with the eye movements that occur in spite of the attempt of the subject to fixate as steadily as possible on a stationary target. A contact lens that rests firmly on the limbus of the cornea is used to support a plane mirror whose surface is normal to the visual axis. Light reflected from the mirror is used to trace out the motions of the eye on a moving photographic film. The resulting records of eye movement reveal the minimal extent of motions of the retinal image under normal viewing conditions. T. G. I. R 9

14,884

Baker, H. D. THE EFFECT OF METHOD UPON THE COURSE OF LIGHT ADAPTATION. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 137-145. USN Physiological Psychology Branch, ONR, Washington, D. C. (Florida State University, Tallahassee, Fla.).

The process of light adaptation has been observed by means of three different measures of visual sensitivity: (1) absolute threshold, (2) equality matches between a dark-adapted retinal area and an area that is adapting to light, and (3) difference threshold. The resulting pictures of light adaptation are compared and the differences discussed. G. R 8

14,885

Gibson, J. J. RESEARCH ON THE VISUAL PERCEPTION OF MOTION AND CHANGE. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 165-175. USN Physiological Psychology Branch, ONR, Washington, D. C. (Cornell University, Ithaca, N. Y.).

A series of experiments on visual perception of motion and change over the past five years are discussed. A reformulation of the problem of motion sensitivity and a number of tentative conclusions, based on these data, are discussed. Instead of having to do with the perception of "motion" in the abstract, the conclusions apply equally to the perception of objects, and of the

rigidity, slant, shape, size, and distance of objects and surfaces. It is suggested that rather than perception of "motion", perception of change--of environmental events as given to the eye by transformations of the optical pattern--is involved; that it is also one aspect of the sensory control of behavior by feedback stimulation. R 15

14,887

Solomon, P., Wexler, D., Kubzansky, P. & Mendelson, J. H. EXPERIMENTAL SENSORY DEPRIVATION. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 237-251. USN Physiological Psychology Branch, ONR, Washington, D. C. (Harvard Medical School, Boston, Mass.).

A series of studies on experimental sensory deprivation are described. The impetus for the studies came from observations of transient psychotic states in some poliomyelitis patients treated in tank-type respirators. The method used for the experiments is described. Isolation was produced by using the tank-type respirator with the subject lying flat on his back with arms and legs in rigid but comfortable cylinders and unable to see anything but the front of the tank. A constant minimal light and noise from the motor was present. Other aspects of method, such as subject motivation, personality tests, and correlation with duration of time in tank are reported. Clinical and polygraphic evidence of stress are discussed. T. G. I.

14,888

Altman, P. L. HANDBOOK OF CIRCULATION. Contract AF 33 (616) 3972, Proj. 7158, Task 71801, WADC TR 59 593, Oct. 1959, 393pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

This report presents data on circulation for man, other animals, and plants arranged in tables, graphs, diagrams, and drawings. There are 17 categories represented: circulatory anatomy; chemical composition and physical properties; blood volumes, cardiac output; heart rate; blood pressures; blood flow and lymph flow; the electrocardiogram; heart sounds and murmurs; effect of pregnancy; effect of oxygen and carbon dioxide concentrations; effect of compression, decompression, and acceleration; effect of radiation; blood coagulants and anticoagulants; effects of drugs and chemical substances; translocation in plants; and effect of pathologic conditions. Contents have been authenticated by 326 leading investigators in the field of physiology. T. G. I. R 3000 (approx.)

14,889

Anthony, A. & Ackerman, E. STRESS EFFECTS OF NOISE IN VERTEBRATE

ANIMALS. Contract AF 33(616) 2505, Proj. 7231, Task 71786, WADC TR 58 622, Sept. 1959, 49pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Pennsylvania State University, University Park, Penn.).

The extra-auditory effects of chronic exposure of laboratory animals to intense noise were investigated. Rats, mice, and guinea pigs were exposed to noise in two frequency ranges (150-4800 cps and 2-40 cps) at a sound pressure level of 135-140 decibels. Exposure time was 20-40 hours per week for periods of two to nine weeks. Stress response of the animals was measured by changes in the adrenal glands and other organs. The data were analyzed in terms of effect of duration of exposure and of low versus high frequency noise. T. G. I. R 47

14,890

Bailey, C. J. & Olson, H. C. ILLUMINATION AND TERRAIN AS FACTORS AFFECTING THE SPEED OF TANK TRAVEL. Contract DA 44 109 GM 650, Proj. 095 30 000, HUMRRO Spec. Rep. 12, March 1958, 38pp. Human Resources Research Office, George Washington University, Washington, D. C.

To obtain data on the travel time of tanks under various combinations of terrain and illumination conditions, 200 tank commander-driver teams were required to drive M48 tanks over a test course. The conditions included 1) five different kinds of terrain, 2) four different levels of natural illumination (daylight, moonlight, starlight, and moonless overcast), and 3) five different kinds of artificial illumination (searchlight, headlight, blackout drive light, infrared headlights with periscope, and no artificial light). Each team drove under only one level of natural illumination and one of artificial illumination. Tank speeds for the course were analyzed for the effect of these conditions. T. R 2

14,891

Baker, D. F. & Crawford, B. M. RANGE LIMITATIONS OF THE CRL MODEL 8 MASTER-SLAVE MANIPULATOR WITH THE SEATED OPERATOR. Proj. 7184, Task 71586, WADC TN 59 359, 12pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

The master-slave manipulator is now widely used as a general purpose tool for remote handling. Heretofore, common practice has been for the worker engaged in remote handling to stand while working. However, it is probable that under some circumstances in the future (in a space vehicle situation) the operator may be required to work while in a sitting position. A study was conducted to determine the extent of limitations upon the inherent work range of the

master-slave manipulator (CRL Model 8) when the operator is seated. Contours of effective performance areas in five horizontal planes were determined. G. I. R 4

14,894

Chernikoff, R., Ducey, J. W. & Taylor, F. V. TWO-DIMENSIONAL TRACKING WITH IDENTICAL AND DIFFERENT CONTROL DYNAMICS IN EACH COORDINATE. NRL Prob. Y02 11, Proj. NA 550 010, BuAer AE 7047, NRL Rep. 5424, Nov. 1959, 6pp. USN Research Lab., Washington, D. C.

In many complex tracking devices the control dynamics may differ in the various coordinates. This required the operator to supply a different transfer function in each tracking dimension. The purpose of this investigation was to determine the effect upon tracking produced by using various pairings of position, rate, and acceleration control dynamics in the X and Y coordinates of a two-dimensional tracking system. Performance scores for six subjects, who were given trials under all conditions, were analyzed for the conditions of minimum error. The findings are interpreted in terms of the limitations of the information-handling capacity of human operators. T. G. I. R 2

14,895

Darby, C. L., Brown, W. F., Smith, C. D. & Fightmaster, W. J. THE DEVELOPMENT OF JOB DESCRIPTIONS FOR NIKE AJAX BATTERY OFFICERS. Tech. Rep. 54, April 1959, 76pp. Human Resources Research Office, George Washington University, Washington, D. C.

This study is the first stage of a research project designed to determine the level of skill and knowledge required of officers assigned to NIKE-AJAX (surface to air missiles) batteries so that courses of instruction can be scientifically devised to train officers for their required duties. Information was obtained from experienced officers through checklist responses indicating the importance of and training needs associated with activities drawn from a job description. This report contains final job descriptions for five officers and training need check lists. The use of this material for establishing training courses is discussed. T. I.

14,896

Davis, R. C., Garafolo, L. & Kveim, K. CONDITIONS ASSOCIATED WITH GASTROINTESTINAL ACTIVITY. J. comp. physiol. Psychol., Aug. 1959, 52(4), 466-475. (Indiana University, Bloomington, Ind.).

A series of experiments are reported in which the effects of food, rest, visual stimulation, and a gastric balloon on activity

recorded from the abdomen by external electrodes were investigated. In some of the experiments simultaneous recordings of electrical activity and recordings from the gastric balloon were made and compared. Subject reports of stomach contractions were also obtained and studied for correspondence with the other records. The results were compared to studies in the literature on "hunger pangs" and some possible errors in methodology were noted. G. I. R 11

14, 897

Davis, R. C. SOMATIC ACTIVITY UNDER REDUCED STIMULATION. J. comp. physiol. Psychol., June 1959, 52(3), 309-314. (Indiana University, Bloomington, Ind.).

To determine the condition of somatic variables under low levels of stimulation, two groups of subjects were studied. One group lay on a cot in a dark, soundproofed room for about 40 minutes; the other group was given five minutes of rest followed by continuous moderate light and sound. Recordings were made of muscle potentials from three locations, of circulatory and of respiratory variables. The changes in these records over the period in the two groups were compared. To account for the pattern observed in the reduced stimulus group a hypothesis of increased sensitization or "anticipation" is proposed. G. R 11

14, 898

Doolin, B. F., Smith, G. A. & Drinkwater, F. J., III. AN AIR-BORNE TARGET SIMULATOR FOR USE IN OPTICAL-SIGHT TRACKING STUDIES. NACA RM A55F20, Sept. 1955, 33pp. National Advisory Committee for Aeronautics, Washington, D. C. (Ames Aeronautical Lab., Moffett Field, Calif.).

The design and flight evaluations of an air-borne target simulator for use in tracking studies of fighter-type airplanes equipped with optical gunsights is described. The investigation purposed to obtain experience and to demonstrate feasibility of air-borne target simulation for optical gunsight tracking research. The results suggested that the principles involved are applicable to weapons-system evaluation, to pilot training, and to precision flight-maneuver instrumentation. G. I. R 6

14, 899

Duey, J. W. & Chernikoff, R. THE USE OF QUICKENING IN ONE COORDINATE OF A TWO-DIMENSIONAL TRACKING SYSTEM. Proj. NA 550 010, Prob. NRL Y02 11, BuAer AE 7047, NRL Rep. 5428, Nov. 1959, 5pp. USN Research Lab., Washington, D. C.

In a previous study (14, 894) it was found that tracking error in one coordinate of a two-dimensional tracking system was affected by the dynamics used in the other coordinate. This study sought to determine how the introduction of quickening into one coordinate of a second-order, two-coordinate tracking system would affect performance in the unquickened coordinate. Eight subjects performed the tracking task under each of eight conditions: each of the dynamics, acceleration and quickened acceleration, was tracked separately in each coordinate for both one- and two-coordinate conditions. Tracking errors were analyzed for the effect of system dynamics. T. G. I. R 3

14, 900

Ferguson, C. N. & Lappala, R. P. DEVELOPMENT OF IMPROVED FLIGHT HELMET LINER. Contract AF 33(600) 34149, Proj. 6336, Task 63619, WADC TR 59 435, Oct. 1959, 17pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Bjorksten Research Laboratories, Inc., Madison, Wisc.).

The suitability of various low-density plastic foam systems was evaluated for use as a padding helmet liner which would provide maximum comfort with greatest protection against shock and impact. Means of fabricating uniform and reproducible liners by injection of fluid foam into molds were studied. A liner was developed which appears to meet specification requirements for comfort, ease of application, and durability. A description of the liner is given. G. I.

14, 901

Forbes, T. W. HUMAN FACTORS IN HIGHWAY DESIGN, OPERATION AND SAFETY PROBLEMS. Aug. 1959, 12pp. Highway Traffic Safety Center, Michigan State University, East Lansing, Mich.

Human engineering factors in the design and operation of highways are discussed with regard to their contribution to improvement of traffic efficiency and safety. Experimental studies of the way in which driver perception, judgment, and response time can be affected by highway design factors are reviewed. Problems of traffic flow and experimental data relating to the factors involved are presented. The use of mathematical models and simulation in the study of traffic flow are discussed. Examples are given of other human factors data already available or obtainable through specialized studies that suggest ways of obtaining more efficient driver-vehicle-highway-and-environment interrelationships. G. I. R 12

14, 902

Finch, D. M., Charlton, J. M. & Davidson, H. F. THE EFFECT OF SPECULAR

REFLECTION ON VISIBILITY. Ca. 1957, 39pp. University of California, Berkeley, Calif.

The physical characteristics of a task and the distribution of flux from a lighting system as they affect the visibility of an object were evaluated quantitatively in two separate studies. In both studies, samples of handwriting in pencil and of printed ink material were used as tasks. Physical measurements using a microphotometer were made in one study and a visibility meter was used in a series of field studies. Results of both sets of measurements were expressed in terms of loss of contrast due to specular reflections within the task, and therefore decrease in visibility. The concept of directional reflectance of materials and brightness factors are discussed. T. G. I. R 15

14,903

Hasbrook, A.H. HUMAN FACTORS - THE BASIS FOR CRASH SAFETY DESIGN. Contract NONR 2883(00), AV CIR 63 0 108, Sept. 1959, 19pp. Aviation Crash Injury Research, Flight Safety Foundation, Phoenix, Ariz.

This discussion of designing aircraft for crash safety revolves about three factors: 1) the resistance of the human body to injury under various conditions of crash force; 2) the resistance of aircraft structure to collapse under various accident conditions; and 3) the type and severity of impact to which the aircraft is subjected. Available data are brought to bear on these three topics and various design problems are discussed. G. R 2

14,905

Johannsen, Dorothea E. BLACK-WHITE RELATION OF FIGURE AND GROUND IN NURSERY SCHOOL CHILDREN'S FIGURE PERCEPTION. Percept. Mot. Skills, 1960, 10, 23-26. (Tufts University, Medford, Mass.).

To test the hypothesis that a dark figure on a light ground is easier to perceive than the reverse, 40 nursery school children were required to select the cutout figure of the animal (from among six) which was the same as that on the stimulus card. There were 60 stimulus cards in five degrees of distinctness of figure; in 30 the figure was light on dark and in 30, dark on light. Correctness of discrimination was analyzed as affected by age and the figure-background relation. Qualitative differences in manner of attacking the problem are discussed. T. R 4

14,906

Kay, F.DeW., Jr. & Hobson, W., Jr. A RADIOBIOLOGY GUIDE. PART II. Contract AF 33(616) 5491, Proj. 7165, Task 71838, WADC TR 57 118(II), May 1959,

117pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (RCA Service Company, Camden, N. J.).

This Guide examines the practical aspects of radiation protection and radiological health. The following topics are treated: biological effects of radiation, monitoring instruments and techniques, health physics, radiation exposure control, facility design, protective devices, decontamination, permissible doses, emergency procedures, medical treatment of radiation injury, handling and shipping radioactive material, and disposal of radioactive waste. A typical radiological laboratory has been assumed and discussions directed to its requirements relating to radiation protection. A detailed table of radioisotope data is included. T. G. I. R. 411

14,907

Kolstoe, R.H., Hammock, J.C., Rozran, G.B., Czeh, R.S., et al. ORDNANCE IFC ELECTRONICS MAINTENANCE PERSONNEL. ANALYSIS OF ACTIVITIES WITH IMPLICATIONS FOR TRAINING. PART I - M-33. Tech. Rep. 31, Sept. 1956, 99pp. Human Resources Research Office, George Washington University, Washington, D. C.

To provide information concerning the job in the field of third- and fourth-echelon electronics maintenance personnel in ordnance detachments, data were gathered from 381 officers and enlisted men in 30 detachments in various geographic locations. The data concerned pre-Army background of the men, types of school and job training and its relevance to the job in the field; the specific job activities performed; use of test equipment, test procedures and technical manuals; and estimates of proficiency of repair personnel. Questionnaires, interviews, rating scales, card-sorting tasks, record forms, and observations were used to gather information. On the basis of the results of an extensive analysis of the data, recommendations are made concerning job requirements and job training. T. G.

14,908

Lewis, A. & Kanareff, Vera T. USE OF AUTOCORRELATION AND UNCERTAINTY MEASURES FOR THE ANALYSIS OF DECISION BEHAVIOR. Contract AF 33(616)5845, Proj. 7183, Task 71618, WADC TR 59 434, Aug. 1959, 34pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Fels Group Dynamics Center, University of Delaware, Newark, Del.).

A discussion of two methods of analysis of sequential dependencies is discussed in relation to the study of decision behavior. The methods considered are auto-correlation and uncertainty analysis. Each of these approaches is described in

44-243

14,915

terms of computational techniques and specific applications are presented. T. G. R 28

14,910

Wang, R.I.H., Kereiakes, J.G., Anderson, R.R. & Krebs, A.T. SYN-
ERGISTIC EFFECT OF CERTAIN RADIO-
PROTECTIVE COMPOUNDS. USAMRL
Proj. 6X64 14 001 03, Rep. 407, Dec. 1959,
16pp. USA Medical Research Lab., Fort
Knox, Ky.

To determine the degree of protection
afforded mice against lethal and supralethal
doses of radiation by optimum concentra-
tions and radioprotective compounds, the
following chemical compounds were studied:
beta-mercapto-ethylamine (MEA), beta-
amineoethylisothiuronium (AET), and five-
hydroxytryptamine (serotonin). The con-
centrations chosen for these agents, whether
when used alone or in combination, were at
dosages that produced no death in any of the
control (non-irradiated) mice or on the first
two days following radiation exposure. Ra-
diation exposures of 800, 900, and 110 ro-
entgens were studied. T. G. R 8

14,911

Maruyama, K., Ohwaki, Y. & Okubo,
Y. MEASUREMENT OF THE FATIGUE OF
WORKERS IN A METAL MINE. Tohoku
Psychologica Folia, 1959, 1-25. (Institute
of Psychology, Tohoku University, Sendai,
Japan).

Measurements of fatigue were made on
175 miners of Taro Mine in Iwate Prefecture,
Northern Japan. Measurements consisted of
critical flicker fusion decrements between
pre- and post-work values, body weight de-
crements between pre- and post-work values
and subjective reports of fatigue (reported
fully elsewhere). The variables considered
were the kind of work (rockdriller, timber-
man, tranmer, chuteman, cagetender, tip-
pler, and battery locomotive operator), the
difference between pits (atmospheric tem-
perature difference), and the day of the week
(six-day week). Differences in decrements
due to the variables were analyzed and dis-
cussed in relation to subjective feelings of
fatigue and to accident occurrence rate in
the mine. T. G. I. R 4

14,912

Newton, J.M. TRAINING EFFECTIVE-
NESS AS A FUNCTION OF SIMULATOR COM-
PLEXITY. Contract N61339 458, Tech. Rep.
NAVTRADEVCON 458 1, Sept. 1959, 93pp.
USN Training Device Center, Port Washing-
ton, N. Y. (Electric Boat Div., General
Dynamics Corporation, Groton, Conn.).

To compare the effectiveness of train-
ing devices having various degrees of simu-
lation of an operational task, a one-man task
in the control of course and depth of a high-
speed submarine was selected for study.

The performances of depth changing only,
course changing only, and simultaneous
depth and course changing were measured on
five trainers which varied in realism of sim-
ulation from the Universal Submarine Sim-
ulator (performance on which was used as
criterion) which is highly realistic with
complete equations for motion to the simu-
lator with no motion. Subjects were trained on
one of the five simulators and then tested on
the most realistic device. Implications of
the results for simulation devices are dis-
cussed. T. G. I. R 10

14,913

Rathert, G.A., Jr., Creer, B.Y. &
Douvillier, J.G., Jr. USE OF FLIGHT
SIMULATORS FOR PILOT-CONTROL
PROBLEMS. NASA Memo. 3 6 59A, Feb.
1959, 14pp. National Aeronautics and Space
Administration, Washington, D.C. (Ames
Research Center, Moffett Field, Calif.).

Comparisons were made between ac-
tual flight results and results obtained with
fixed and moving flight simulators in a num-
ber of phases of flying airplanes with a wide
range of characteristics. These results
were then used to study the importance of
providing motion stimuli in a simulator in
order that the pilot operate the simulator in
a realistic manner. Regions of airplane
characteristics where motion stimuli are
either mandatory or desirable are indicated.
G. I. R 2

14,914

Roos, C. & Barry, Jeannette. BIBLI-
OGRAPHY OF MILITARY PSYCHIATRY
1952-1958. May 1959, 83pp. US National
Library of Medicine, Dept. of Health,
Education, and Welfare, Washington, D.C.

This bibliography of Military Psychi-
atry covers the period 1952 through 1958
with a few selected references from the
early months of 1959. Occasional annota-
tions have been added to the entries which
are arranged under the following subject
matter areas: manpower utilization, preven-
tive and social psychiatry, combat psychi-
atry, therapy, psychosomatic problems,
neurology and physiology, problems of spe-
cial situations and environments, aviation
psychiatry and psychology, forensic military
psychiatry, clinical psychology, psychiatric
social work, psychiatric teaching and train-
ing, prisoners-of-war, suicide, reviews,
bibliographies and abstracts, research and
statistics, and history. There is an author
index. R 736

14,915

Sjoberg, S.A., Russell, W.R. & Al-
ford, W.L. FLIGHT INVESTIGATION OF
A SMALL SIDE-LOCATED CONTROL STICK
USED WITH ELECTRONIC CONTROL SYS-
TEMS IN A FIGHTER AIRPLANE. NACA

14, 917

RM L56L28a, March 1957, 43pp. National Advisory Committee for Aeronautics, Washington, D.C. (Langley Aeronautical Lab., Langley Field, Va.).

This paper describes results of a flight test program in which a small stick (about four inches long) mounted at the end of an arm rest at the pilot's side was used as the airplane maneuvering flight controller. The side-located controller was used with both a rate automatic control system and an irreversible electronic power control system. Rapid and universal maneuvering was accomplished with each system by each of 14 experienced pilots. Pilot opinions were obtained in post-flight interviews and questionnaires on the suitability of the controller. T. G. I. R 3

14, 917

Weltman, G., Groth, Hilde & Lyman, J. AN ANALYSIS OF BIOELECTRICAL PROSTHESIS CONTROL. Rep. 59-19, Tech. Rep. 1, July 1959, 54pp. Dept. of Engineering, University of California, Los Angeles, Calif.

Prosthesis control with bioelectric signals is analyzed in terms of the signal's function within a body communication link. Three types of signals are considered: Electromyographic (EMG), Electroencephalographic (EEG), and Electroneurographic (ENG). The signals and the terms used in the analysis are defined, and pertinent studies reviewed in terms of the relation of the signals to both neuromuscular events and external stimuli. The studies are evaluated with regard to practical usage of the signals. Experimental work that should lead to an adequate specification of practical control site parameters is outlined. G. I. R 52

14, 918

Zechman, F.W., Cherniack, N.S. & Hyde, A.S. VENTILATORY RESPONSE TO FORWARD ACCELERATION. Proj. 7222, Task 71746, WADC TR 59 584, Sept. 1959, 16pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

This report presents the findings of two series of experiments dealing with the effect of forward acceleration on respiration in man. In the first, the effect of five, eight and twelve g on respiratory frequency, tidal volume, minute volume, and nitrogen elimination were determined. In the second, oxygen consumptions were measured before, during, and after accelerations of five, eight, and twelve g. In both series the trunk was inclined 12 degrees in the direction of acceleration and a rate of onset of one g per second was used. T. G. I. R 16

14, 919

Sendroy, J., Jr. & Cecchini, L.P. INDIRECT ESTIMATION OF BODY SURFACE

AREA AND VOLUME. Res. Rep. NM 31 01 00 01 01, May 1959, 215-224. USN Medical Research Institute, Bethesda, Md.

A convenient and rapid photographic technique of obtaining data that can be used for the calculation of human body surface area is described. Results are in good agreement with values obtained by a reliable method of readings from a chart. Empirical equations for the calculation of body volume (and density) in man, based essentially on measurements of weight and height, are presented. Comparison of the reliability of the results with those obtainable by established methods of quantitation is made. T. G. R 28

14, 920

Sendroy, J., Jr. SURFACE AREA TECHNIQUES AND THEIR RELATIONSHIP TO BODY COMPOSITION. Lecture and Review Series 59 2, March 1959, 14pp. USN Medical Research Institute, Bethesda, Md.

This paper considers the status of surface area methods as techniques of measurement and evaluates their applicability to the determination of various aspects of body composition, as they may be reflected by the relationship of area to other anthropometric or physiological parameters, such as basal metabolism, body volume, lean body mass, body fat, body water and density. Both direct physical measurements (coating, skinning, triangulation and integration) and indirect estimations (various types of mathematical formulas for calculating surface area from its geometric relations to the major dimensions of the body) are discussed. R 44

14, 921

Schock, G.J.D. PERCEPTION OF THE HORIZONTAL AND VERTICAL IN SIMULATED SUBGRAVITY CONDITIONS. Proj. 7851, Task 78501, AFMDC TN 59 13, June 1959, 13pp. USAF Aeromedical Field Lab., Holloman AFB, N. M.

To investigate the ability of subjects to perceive the true horizontal and vertical in subgravity conditions, subjects were tested while immersed in water to simulate such conditions. Each subject, equipped with self-contained underwater breathing apparatus, was seated in a chair and asked to direct the movement of a luminous bar to what he perceived to be the true horizontal and vertical. Various degrees of head and body tilt were used. Tests were repeated on land without visual cues. Errors in judging the horizontal and vertical were compared for the two conditions. T. R 3

14, 922

Sidorsky, R.C. & Allen, F.L. SHIP CONTROL IX AN EVALUATION OF A HORIZON-AT-INFINITY IN A CONTACT ANALOG DISPLAY. Contract NONR 2512

(00), Proj. SUBIC, P59 140, Electric Boat Tech. Rep. SPD 59 084, Aug. 1959, 10pp. Electric Boat Division, General Dynamics Corporation, Groton, Conn.

The value of the display of a horizon-at-infinity as an aid in depth control of a submarine with a Contact Analog (CA) Display was investigated. Three experimental displays were used: 1) a basic two-surface CA, 2) the basic CA with a horizon-at-infinity, and 3) the horizon-at-infinity without the associated CA surfaces. The subjects were divided into groups of seven, each group being tested on a different display on a task involving changing the depth of a simulated submarine. Mean depth errors and the standard deviations associated with each of 13 depth levels were compared for the three displays. T. G. I. R 10

14,923

Sidersky, R. C. ABSOLUTE JUDGMENTS OF STATIC PERSPECTIVE TRANSFORMATIONS. Oct. 1958, 5pp. Electric Boat Division, General Dynamics Corporation, Groton, Conn. (Reprinted from: J. exp. Psychol., Oct. 1958, 56(4), 380-384).

To determine the degree to which accurate estimates of the extent of a perspective transformation depend upon motion in the stimulus, static perspective images corresponding to a flat grid-patterned surface viewed at various pitch angles were projected onto a vertical screen. The 21 perspective patterns that would result from rotation of observer in two-degree steps from zero to -40 degrees were displayed to 25 naval officers who were then asked to judge the extent of their apparent rotation in the medial plane. The method of absolute judgments was employed. Mean estimate and variability of judgments for each pitch angle were calculated. Implications for the contact analog display system for flight are noted. G. I. R 7

14,924

Ronchi, Lucia & Ascarelli, Ester. ON THE INFLUENCE OF THE INCOMPLETE ADAPTATION OF THE PERIPHERAL RETINA ON THE SPEED OF READING. Atti Della Fondazione Giorgio Ronchi, Jan.-Feb. 1959, 14(1), 55-62.

Changes in the speed of reading were investigated during the adaptation to light of the peripheral retina. Luminance level of the peripheral field was mesopic (either blue or green), while that of the foveal test field was in the photopic range. The first series was completed after the subject had been dark adapted for 25 minutes; the second series was completed after the onset of the peripheral light; and the third series after 25 minutes of dark adaptation followed by 25 minutes of adaptation to the peripheral light. Three subjects were tested. Data from the three conditions were compared

for the effect of incomplete adaptation. G. I. R 9

14,925

Ormiston, D. W., Rohles, F. H., Jr. & Grunzke, M. E. A DEVICE FOR MEASURING GROSS MOTOR BEHAVIOR IN PRIMATES. Proj. 7183, Task 71620, WADC TN 59 353, Oct. 1959, 4pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

To meet the need for a method of measuring gross motor behavior as affected by gravitational forces, a jumping device for primates was developed. It consisted of a large box with a stand at each end and a well, carrying a constant electrical charge, in the middle. Shock, preceded by a tone, was used to make the animal jump over the well to the opposite side. Motion pictures of the jump, as viewed through the plexiglass side and top, allowed measurement of the height and distance of the jump. Other possible uses of the device are described. I.

14,926

Michaels, R. M. INTENSITY DISCRIMINATION FOR NARROW BANDWIDTHS OF NOISE AT VARIOUS PULSE LENGTHS. Proj. NR 442 000, Task NR 442 003, NRL Prob. S03 03, NRL Rep. 5188, Oct. 1958, 28pp. USN Research Lab., Washington, D. C.

Upon the assumption that the auditory system acts as an envelope detector, a series of hypotheses were stated predicting how intensity discrimination would be influenced by the variations in the stimulus envelope. Filtered random noise of four bandwidths and four pulse durations were used to vary the rate and number of fluctuations. Seven listeners heard two pulses of noise in succession, judging the intensity of the second relative to the first. The physical differences were determined by taking the ratio of the total energy in each pulse. A transition curve for the responses to the various stimulus differences was plotted and the difference limen taken as the probable error of the fitted curve. The results were studied with respect to the envelope detector model of auditory discrimination. T. G. I. R 14

14,928

Lavender, H. J., Busch, A. C. & Sklodowski, V. A. SELECTED ABILITIES AFFECTING TECHNICIAN'S PROFICIENCY IN MISSILE SYSTEMS. Oct. 1959, 19pp. Human Factors Engineering Group, Avco Corporation, Cincinnati, Ohio.

To attempt identification of variables, other than electronic proficiency, that may be indicative of a successful electro-mechanical trainee for missile systems, a

list of characteristics that one should possess for entrance into a specialized missile training program was drawn up and evaluated with reference to job descriptions. Ten different psychological tests, each purporting to measure different areas of these abilities, aptitudes, or knowledges was administered to 71 military and 49 civilian electronic technician trainees. A factor analysis was used to identify groupings of variables characteristic of this group and a multiple correlation analysis was performed to identify these test variables with the criterion (training school grades).

T. G. R 14

14, 929

Jacobius, A. J., Wilkins, Madeleine J., Kassianoff, L., Slie, Rita B., et al. 1953 LITERATURE AVIATION MEDICINE AN ANNOTATED BIBLIOGRAPHY VOLUME 2. 1959, 354pp. Aero Medical Association, St. Paul, Minn. (The Library of Congress, Washington, D. C.).

This bibliography on aviation medicine covers 1953 literature and some studies from 1952 not included in the first volume. The items, which consist of the complete reference and an informative abstract, are arranged alphabetically with cumulative author and subject indexes included. Areas of subject coverage are: 1) history and general aspects of aviation medicine, 2) aviation psychology, 3) pathology and pharmacology, 4) aviation physiology, 5) preventive medicine and sanitation, 6) special problems in high-altitude and space flight, and 7) miscellaneous problems. R 1386

14, 930

Imus, H. A. & Fuelling, J. L. DISQUALIFICATIONS FOR FLIGHT TRAINING DUE TO OCULAR DEFECTS. Spec. Rep. 59 3, May 1959, 5pp. USN School of Aviation Medicine, Naval Air Station, Fla.

A review of physical disqualifications for flight training revealed that 56 out of 224 cases during the period 14 February 1957 to 27 October 1958 were due to ocular defects. An analysis of the complete record of the eye examination of each case disqualified on this basis was made to determine the actual defects involved. T.

14, 931

Hunt, G. H. & Mohler, S. R. AGING A REVIEW OF RESEARCH AND TRAINING GRANTS SUPPORTED BY THE NATIONAL INSTITUTES OF HEALTH. Public Hlth. Service Publ. 652, Dec. 1958, 50pp. US Department of Health, Education, and Welfare, Washington, D. C. & National Institutes of Health, Bethesda, Md.

The research and training projects in aging which are supported by the National Institutes of Health are described. Each

project is classified within each Institute and the Division of General Medical Sciences according to an outline which is used by the Center for Aging Research. The major topics in the outline are 1) gerontology—general, 2) major multidisciplinary research projects, 3) structural aspects of aging, 4) physiological and biochemical aspects of aging, 5) psychological aspects of aging, 6) social aspects of aging, 7) identifiable disease processes, and 8) training. R 124

14, 932

Hitchcock, L., Jr., Mager, R. F. & Whipple, J. E. DEVELOPMENT AND EVALUATION OF AN EXPERIMENTAL PROGRAM OF INSTRUCTION FOR FIRE CONTROL TECHNICIANS. Contract DA 44 109 QM 650, Proj. 095 30 000, HUMRRO Tech. Rep. 46, May 1958, 29pp. Human Resources Research Office, George Washington University, Washington, D. C.

This study is part of a long-range research program in electronic maintenance and operator training. An experimental course of instruction for the M33 Fire Control System Maintenance Course of the U. S. Army Air Defense School was developed on the basis of a previous analysis of trouble shooting behaviors and maintenance habits of experienced and inexperienced technicians. Two classes of technicians received training in the experimental course and were compared with graduates of the standard course on the M33 Mechanic Proficiency Test (a performance test). Recommendations for curriculum modifications are made. T. G.

14, 933

Freedman, S. J. & Greenblatt, M. STUDIES IN HUMAN ISOLATION. Contract AF 33(616) 5663, Proj. 7220, Task 71741, WADC TR 59 266, Sept. 1959, 46pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Massachusetts Mental Health Center, Boston, Mass.).

Thirty normal college-age subjects were run in eight-hour experimental sessions that involved: 1) non-patterned visual and auditory input combined with social isolation, 2) visual deprivation (blackout) combined with auditory patterning and social isolation, and 3) social isolation alone. Perceptual and cognitive distortions and disorientations differentially induced by these conditions are described. Six additional somewhat "deviant" subjects were run under the first condition. The relationship between visual and cognitive imagery was analyzed. A theoretical formulation is proposed to account for the perceptual distortions reported. T. I. R 34

14,934

Fraizer, J.J. ELECTROLUMINESCENT LIGHTING OF AIRCRAFT INSTRUMENTS. Contract AF 33(616) 5277, Proj. 1373, Task 13683, WADC TR 58 510, Sept. 1958, 141pp. USAF Flight Control Lab., Wright-Patterson AFB, Ohio. (The General Electric Company, Ithaca, N. Y.).

This report describes the work done in applying electroluminescent lamps to a group of aircraft instruments (tachometers, flow meters, voltmeters and two vertical tape devices). Specific problems encountered are discussed. The results of an investigation of the properties of electroluminescent lamps which were supplied by five manufacturers are presented. The investigation includes a study of the effects of temperature, voltage, frequency, and humidity on the brightness of the lamps. T. G. I. R 13

14,935

Davis, L.W. & Basore, B.L. INFORMATION CONTENT OF LEARNED MESSAGES. Contract AF 30(602) 1890, Proj. 4519, Task 45541, QR 3 1004, RADCN 59 209, May 1959, 52pp. Dikewood Corporation, Albuquerque, N.M.

The primary purpose of this study was to investigate the application of communication-theory techniques to the theory of learning. A search of the existing literature was made. Efforts were then made to develop a theoretical model based on the principles of communication and information theory. Mathematical expressions were derived which attempt to describe the results of the learning process in terms of probabilities of postulated events. The expressions were then applied to the learning of "binary mosaics" or simple message patterns. T. G. I. R 27

14,937

Brantley, L.R., Dunham, J.M. & Meyer, H. "SECOND SKIN" PROTECTION AGAINST LOW TEMPERATURE EXPOSURE. FINAL REPORT TO THE OFFICE OF THE QUARTERMASTER GENERAL. Contract DA19 129 QM 795, Proj. DA7 79 10 001C, Jan. 1958, 92pp. Dept. of Chemistry, Occidental College, Los Angeles, Calif.

This report presents the results of work undertaken toward the development of creams, ointments, etc., which, when applied to the hands and part of the face, would offer protection against injurious effects from exposure to low temperatures yet be flexible enough to permit good manual dexterity. Vinyl plastisols with good viscosity stability have been developed under this program. Accelerators are described with which these plastisols can be fluxed at temperatures feasible for the skin to form either dense or foamed coatings with satisfactory physical properties including flexibility at -65 degrees F. New silicone

rubber coatings were found and a two-layer system is described which meets the specifications for the "second skin". T. G. R 4

14,938

Blair, W.C. & Kaufman, H.M. COMMAND CONTROL I: MULTIPLE DISPLAY MONITORING II CONTROL-DISPLAY SPATIAL ARRANGEMENT. Contract NONR 2512(00), Proj. SUBIC, P59 100, Electric Boat Tech. Rep. SPDS9 082, Nov. 1959, 17pp. Electric Boat Division, General Dynamics Corporation, Groton, Conn.

To determine the effect of varying display-control spatial arrangement and total signal frequency on monitoring proficiency, three conditions of display and control separation ranging from grouped to separated were used, each with three displays and associated controls. A separate group of subjects was used for each of the three arrangements. For half the sessions, they were given signals at a high and for the other half at a low frequency rate. The task was to push one set of controls to observe and another to report detections and reset signals. Only one display could be observed at a time. Reset times were recorded as measures of overall proficiency, and frequency and duration of observation were taken as observation measures. T. I. R 3

14,939

Berger, H.M. A NOTE ON THE EFFECT OF SORTIES SCHEDULING ON MAINTENANCE WAIT-TIME. Tech. Memo. 7, Feb. 1958, 14pp. USAF Operations Analysis Headquarters, United States Air Forces in Europe, New York, N.Y.

The problem discussed in this note is the reduction of maintenance wait time (time aircraft has to wait before the required service is started) that is achieved with a fixed maintenance capacity and a fixed flying hours commitment by varying the sortie scheduling. In the case of unscheduled maintenance, a knowledge of the present state of the system should be used to determine the number of sorties on the next flight. In the case of periodic inspection, all that is necessary is that sorties be controlled by aircraft tail number. If both types of scheduling are carried out simultaneously maintenance wait time can be reduced without increasing maintenance resources or decreasing total amount of flying. G. R 5

14,940

Horowitz, M.W. & Fromer, R. A SET OF DISCRIMINABLE SURFACE COLORS AND SYMBOLS FOR CODING IN ANIMATED TRAINING PANELS. Contract N61339 294, Tech. Rep. NAVTRADEVEN 20 OS 52, May 1959, 19pp. USN Training Device Center, Port Washington, N.Y. (Educational Research Corporation, Cambridge, Mass.).

To develop a set of discriminable surface colors and symbols to use for animated training panels, a set of seven colors plus white, light gray and dark gray were selected as representative of readily differentiable color sectors of the color wheel. These colors served as backgrounds for intermediate colors displayed as Landolt rings. Six color-normal subjects were tested for their ability to indicate the position of the break of 72 rings on each background panel. The data (average percent error) were analyzed to discover the 15 most discriminable colors. The procedure for symbol coding involved the ranking (for discriminability) of pairs of symbols (selected from various sources) presented in two different spatial orders by the two experimenters. T. I. R 4

14, 941

Clarke, N. P., Hyde, A. S., Cherniack, N. S. & Lindberg, E. F. A PRELIMINARY REPORT OF HUMAN RESPONSE TO REARWARD-FACING RE-ENTRY ACCELERATIONS. Proj. 7222, Task 71746, WADC TN 59 109, July 1959, 14pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

Tidal volume, electrocardiographic changes, tracking performance ability, and subjective response were evaluated during an acceleration profile designed to encompass several possible rearward facing re-entry patterns. A maximum acceleration of 16.5 g and a total time of 170 seconds were employed. Subjects faced the center of rotation with the trunk and head inclined 12 degrees in the direction of the centrifuge axis; they were supported with a contoured net system. Two of the seven subjects repeated the experiment wearing the MC-2 full pressure suit, both pressurized and unpressurized. T. G. I. R 6

14, 942

Bryan, G. L., Rigney, J. W., Bond, N. A., Jr., LaPorte, H. R., Jr., et al. THE ROLE OF HUMANS IN COMPLEX COMPUTER SYSTEMS: MAINTENANCE. Contract NONR 228(02), Proj. NR 153 093, Tech. Rep. 26, Jan. 1959, 95pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

This investigation was designed to 1) observe and describe maintenance requirements and practices for digital computer systems now in use, 2) examine methods for screening, training, and evaluating computer technicians, and 3) to obtain up-to-date information on the organization and supervision of computer maintenance work. Visits were made to 50 representative computing centers and on-the-site information was collected by means of observation, questionnaires, and interviews. The results presented provided a state-of-the-art summary regarding human factors problems in

maintenance and serve to define computer personnel problems. R 8

14, 943

USA Library. MILITARY ASPECTS OF SPACE EXPLORATION. Spec. Bibliography 16, June 1958, 55pp. USA Library, Adjutant General's Office, Washington, D. C.

This bibliographic survey was made to throw light on available unclassified literature that points up the military implications of space exploration. The materials are arranged in alphabetical order by title within major and subordinate subject groups. The major groups are miscellaneous; United States space effort; Soviet Russia space effort; satellites, trends and developments (electronics, navigation, orbits, propulsion, guidance, control, and telemetry); environmental factors and problems (acceleration, survival, weightlessness); exploration of the moon and Mars; space ships and stations; international and legal aspects; and conferences, conventions, and symposia. R 300 (approx.)

14, 944

Strauss, L. L. THE FEDERAL ROLE IN HIGHWAY SAFETY LETTER FROM THE SECRETARY OF COMMERCE. House Doc. 93, March 1959, 232pp. US Government Printing Office, Washington, D. C.

This report presents the findings and recommendations of a study made to determine what action can be taken by the Federal government to promote the public welfare by increasing highway safety in the United States. A comprehensive body of facts pertaining to the traffic-accident problem and its setting is presented; a review is made of the highway transportation system - human and vehicle factors, the highway element and systems considerations; and an evaluation is presented of current highway safety activities along with recommendations for an adequate safety program. T. G. I. R 162

14, 945

US Coast Guard Headquarters. TYPES OF LIGHT BEAMS FROM AIDS TO NAVIGATION EQUIPMENT. USCG Civil Engng. Rep. CG 250 13, Nov. 1954, 7pp. US Coast Guard Headquarters, Washington, D. C.

This report describes the various types of light beams encountered in aids to navigation work. The following types are described and their purposes or uses discussed: 1) fan beam, 2) pencil beam, 3) converged beam, 4) diverged beam, 5) asymmetrical fan beam, 6) polychrome, and 7) V and H beam. I.

14, 946

US Coast Guard Headquarters. DAYTIME OPERATION OF LIGHTS DURING FOG. USCG Civil Engng. Rep. CG 250 11.

Nov. 1954, 14pp. US Coast Guard Headquarters, Washington, D.C.

The subject of daytime operation of lights on lightships and lighthouses is reviewed in terms of location of the aid with respect to ordinary vessel tracks, the candle power of the light, the degree of reduced visibility caused by fog or haze, and the extent of attendance available at the station. Certain criteria are established for determining when lights should be turned on. T. G.

14, 947

Armington, J. C. & Mitnick, L. L. ELECTROENCEPHALOGRAPH AND SLEEP DEPRIVATION. J. appl. Physiol., March 1959, 14(2), 247-250. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.).

The occipital alpha rhythms were recorded for ten subjects before, during, and after a 98-hour period of sleep deprivation. Five experimental conditions, each lasting two minutes, were employed. The instructions for these conditions were: 1) to keep the mind blank with eyes open; 2) same with eyes closed; 3) to count aloud to ten repetitively, eyes closed; 4) same with eyes open; and 5) to add silently a number, cumulatively, eyes closed. Recordings were made with the subjects standing. The records of electrical activity were analyzed for the effects of the sleep deprivation alone and in combination with problem solving. G. I. R 12

14, 948

Atkinson, R. C. THE OBSERVING RESPONSE IN DISCRIMINATION LEARNING. Contract NONR 233(58), (NR 170 282), Tech. Rep. 4, Sept. 1959, 17pp. Dept. of Psychology, University of California, Los Angeles, Calif.

To gain information about the orienting or observing response in discrimination learning, the typical discrimination task was modified so that an observing response could be identified and directly measured. The experimental situation consists of a series of discrete trials. The sequence is as follows: 1) ready signal to which the subject responds in one of two possible ways (observing response); 2) one of three stimulus events (cues) are presented; 3) the subject responds (discrimination); 4) a final reinforcing event ends the trial. Trial type, reinforcing event, and stimulus schedules were varied. Six groups of 40 subjects per group were run; performance data were analyzed in terms of a Markov chain model for discrimination learning. T. G. R 9

14, 949

Bradley, J. V. UTILIZATION OF MULTIPLE CUES IN PAIRED COMPARISONS. Proj. 7182, Task 71514, WADC TR

59 548, Sept. 1959, 41pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

Subjects were given one, two, or three cues with which to make an either-or decision. Certain hypotheses were formulated to describe the subject's thought processes in utilizing the multiple cues and mathematical models were constructed to simulate them. The models were then used upon data for the single-cue case to predict performance in the multiple-cue case. Predicted performance data were then compared with observed data to test the predictive validity of the model and the tenability of the corresponding hypothesis. The data used for this investigation were discriminations mediated primarily by the tactual sense modality. T. R 13

14, 950

Bittini, Marcella & Ronchi, Lucia. ON THE FACTORS WHICH INFLUENCE THE HUMAN SCOTOPIC ELECTRORETINOGRAM AT DIFFERENT LUMINANCE LEVELS. Atti Della Fondazione Giorgio Ronchi, July-Aug. 1958, XIII(4), 318-323. AFOSR TN 59 334.

How factors such as the total time of variation of the luminance and the behavior of the time derivative of luminance influence the human scotopic electroretinogram are investigated. Blue and green colored stimuli were used at various luminance levels and responses recorded for one subject: 1) to stimuli of equal energy but different time of variation of the luminance, and 2) to stimuli of equal time of variation but different behavior of the time luminance derivative. The results are discussed in terms of the cues for brightness discrimination furnished by the electroretinographic response. T. G. I. R 7

14, 953

Carterette, E. C. & Cole, M. A COMPARISON OF THE RECEIVER OPERATING CHARACTERISTICS FOR MESSAGES RECEIVED BY EAR AND BY EYE. Contract NONR 233(58), Tech. Rep. 2, June 1959, 14pp. University of California, Los Angeles, Calif.

The receiver operating characteristics (ROC) curves for auditory and for visual reception were compared experimentally. Spoken messages were received by earphones in a wide band noise at three different speech-to-noise ratios and the visual messages were exposed briefly in a tachistoscope for various durations so as to give intelligibility levels corresponding to those of the auditory case. Four subjects were tested, on the previously learned word lists, for identification and made confidence ratings on the certainty of their responses on a six-point rating scale. Comparisons were made

14,954

of changes in distributions of rating categories for various speech-to-noise levels, accuracy of reception as function of rating category and the ROC curves. T. G. R 15

14,954

Dwiggins, R.D. FACTORS AFFECTING SIGNALING BY VISUAL METHODS. Ordnance Task 341 366/63083/02040 & 341 366/63058/01040, NAVORD Rep. 6034, Dec. 1957, 26pp. USN Ordnance Lab., White Oak, Md.

A digest of experimental work from various sources is presented as a guide in research and development programs for signalling devices. The factors that affect the effectiveness of the use of visual methods to convey information over relatively large distances are analyzed and discussed in terms of their individual components: physical nature of signal, atmosphere, ambient illumination, and the physiological and psychological response involved in seeing. The following topics are discussed: 1) characteristics of the eye and the seeing process, 2) brightness and visibility thresholds, 3) luminance thresholds for various colors, 4) point sources versus diffuse light, 5) values of background luminance under various conditions, and 6) flashing versus steady lights. T. G. R 10

14,955

Feallock, J.B. & Briggs, G.E. DEVELOPMENT OF SYSTEMS RESEARCH AND DESIGN METHODOLOGY. Contract AF 33(616) 6166, Proj. 60(8 7184), RF Proj. 894, Rep. 3, Dec. 1959, 13pp. Ohio State University Research Foundation, Columbus, Ohio.

This is a progress report which gives brief summaries of major tasks accomplished or under study in the following areas: general systems research employing dynamic task simulation, technical studies and supporting basic research, and design and development of research equipment.

14,956

Ercoles, Anna Maria & Fiorentini, Adriana. VISIBILITY OF THE MACH BANDS AS A FUNCTION OF FIELD LUMINANCE. Atti Della Fondazione Giorgio Ronchi, May-June 1959, XIV(3), 230-235. (AFOSR TN 59 781.)

The visibility of a subjective contour (Mach band) was investigated as a function of luminance. It was found that the dark Mach band is visible at levels lower than the luminance threshold for the bright Mach band. At high levels, however, the luminance gradient required for the perception of the dark band is greater than that required for the bright band. G. R 7

14,957

Enoch, J.M. THE EFFECT OF IMAGE DEGRADATION ON VISUAL SEARCH: BLUR A SUBTASK WHICH IS PART OF THE PROGRAM ON HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION. Contract AF 30(602) 1580, OSURF Proj. 696 & Proj. 1763, Task 39885, MCRL Tech. Paper (696) 16 280, RADC TN 59 63, Jan. 1958, 23pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

The effect of blur on visual search was studied with the modified ophthalmograph apparatus. The display material consisted of experimental aerial maps containing only areas of white, black, and five shades of gray with the critical detail (Landolt "C") inserted in approximately equally weighted zones. Various degrees of blur were produced in successive displays. Six subjects viewed the displays in fixed order and searched for the critical detail (target). Analysis of data (duration of fixation, correct identifications) was made for effect of quadrant, zone, direction of eye fixation, and blur gradient. The implications of these findings for actual search situation are discussed. G. I. R 9

14,958

Erlick, D.E. JUDGMENTS OF THE RELATIVE FREQUENCY OF SEQUENTIAL BINARY EVENTS: EFFECTS OF FREQUENCY DIFFERENCES. Proj. 6190, Task 71556, WADC TR 59 580, Oct. 1959, 17pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

The accuracy of discriminating which of two events occur more frequently when both are presented in a random sequential order, at a constant rate too fast to permit counting, was investigated. Subjects were required to indicate on a ten-centimeter scale the proportion of time occupied by the more frequent event. Each judgment was based on a total of 100 events with overall per cent differences between the occurrence of the two elements being 0, 4, 10, and 14. Ten subjects were tested. Estimated proportions were compared to actual proportions, and mean proportion of correct judgments were analyzed as a function of frequency differences. T. G. I. R 3

14,959

Gatling, F.P. EJECTION SEAT STUDY. Aero Medical Dept. Rep. AM 2 59, 1959, 41pp. USN Aviation Safety Center, Naval Air Station, Va.

An analysis of ejections from naval aircraft for the calendar year 1958 is presented with recommendations for research

IV 251

14,965

and testing of new equipment for low altitude ejection. The analysis presents 1) ejection rate per 10,000 hours for the years from 1951 through 1958, 2) fatality rates, 3) injuries as affected by altitude of ejections, 4) speed as a factor in injuries, 5) where injuries were sustained, 6) model aircraft, 7) altitude, and 8) emergency preceding ejection. T. G. I.

14,960

Gaylord, R. H. HUMAN ENGINEERING DESIGN RECOMMENDATIONS FOR MINIATURIZED EQUIPMENT. Contract DA 36 039 SC 75054, DA Proj. 3 89 01 602, Quart. Rep. 2, Nov. 1958, 4pp. American Institute for Research, Pittsburgh, Penn.

Partial completion of a draft of the Human Engineering Miniaturization Guide has resulted from analysis and collation of information in the literature. A tentative outline is included. The literature so far examined yields considerable information needed for designing small displays but is generally lacking in information necessary in designing small controls. Results to date of canvassing manufacturers of man-machine linkage means are described.

14,961

Gerathewohl, S. J. EQUIPMENT FOR MANNED SPACE CAPSULES AND LUNAR BASES. SPECIAL REPORT. Feb. 1959, 28pp. USA Medical Research and Development Command, Headquarters, Office of the Surgeon General, Washington, D. C.

Equipment variables which are thought to be significant for man's exploration and survival in space are discussed and sets of research tasks necessary for the accomplishment of manned space missions are proposed. Specific areas so treated are 1) equipment for safety, comfort, and survival; 2) the engineered environment; 3) emergency and survival; 4) pilot support; 5) space communication; 6) human performance in space vehicles; and 7) instrumentation and equipment for operational and environmental research. R 31

14,962

Gatling, F. P., Wurzel, E. M. & Britton, J. H. TRENDS IN NAVAL AVIATION INJURY PATTERNS. Aero Medical Dept. Rep. AM 3 59, June 1959, 12pp. USN Aviation Safety Center, Naval Air Station, Va.

Data from the Naval Aviation Safety Center were accumulated from accident reports from the close of World War II (1946) through 1958. The data were examined and tabulated by specific accident type, phase, and damage classifications in current use at the Safety Center. Corresponding tables

were constructed for fatal injuries. In addition, bailouts and ejections and their relation injury patterns were developed from the data. These tabular presentations were analyzed for trends in accident aircraft patterns. T. I.

14,963

Jones, Edna M., Gaylord, R. H. & Folley, J. D., Jr. GUIDE TO HUMAN ENGINEERING OF MINIATURIZED EQUIPMENT. FINAL REPORT. Contract DA 36 039 SC 75054, AIR 261 59 FR 202, June 1959, 63pp. American Institute for Research, Pittsburgh, Penn.

This guide contains information applicable to the special human engineering problems encountered in the design of miniaturized equipment. It is intended to serve both as a source book of known facts and of suggested principles, and as a means for calling attention to some of the problems created by miniaturization. Section I presents some fundamental concepts and definitions; Section II describes a procedure for human engineering of miniaturized equipment; and Section III presents facts related to each of three proposed solutions to the problem of providing adequate man-machine linkage where space is extremely limited. Actual measured swept areas for different types of controls, tables of data on size recommendations, and related design recommendations are included. T. G. I. R 11

14,964

Martin, C. L. (Proj. Officer). FIXED-WING INSTRUMENT PRESENTATION EVALUATION OF THE SPERRY INTEGRATED INSTRUMENT SYSTEM. Proj. NR AVN 1557 2, Jan. 1958, 23pp. USA Aviation Board, Fort Rucker, Ala.

To evaluate the Sperry Integrated Instrument System (SIIS) as part of the overall Fixed-Wing Instrument Program, the system was installed in an Army aircraft (L-23B, No. 53-6164) and was flown 150 hours. All types of approved instrument approaches and instrument training maneuvers were performed. Aviators with varying degrees of instrument experience were given instruction in the use of this equipment, and transition or training time was recorded. Comparisons of performance with SIIS were made with that possible from present standard displays. Recommendations are included. I. R 7

14,965

Manne, A. S. ON THE JOB SHOP SCHEDULING PROBLEM. Contract NONR 358(01), NR 047 066, Cowles Foundation Discussion Paper 73, May 1959, 7pp. Cowles Commission for Research in

Economics, University of Chicago, Chicago, Ill.

This is a proposal for the application of discrete linear programming to the typical job shop scheduling program--one that involves both sequencing restrictions and non-interference constraints for individual pieces of equipment. No attempt has been made to establish the computational approach in the case of large-scale realistic problems. The formulation presented here is suggested for computer experimentation. R 4

14, 966

Meehan, J. P. & Jacobs, Edith. PHYSIOLOGIC PRODUCTION OF CATECHOLAMINES IN RESPONSE TO SEVERAL PHYSICAL STRESSES. Contract AF 33(616) 5591, Proj. 7220, Task 71742, WADC TR 59 534, Sept. 1959, 19pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Physiology, University of Southern California, Los Angeles, Calif.).

To investigate some aspects of the behavior of the sympathetic nervous system, measurements of the physiologic production of adrenaline and noradrenaline in response to four standardized physical stresses were made on young adult males. The tests were 1) cold pressor test, 2) Harvard Step Test, 3) treadmill exercise, and 4) centrifuge positive accelerations. Chemical techniques were used to measure the compounds in both blood and urine samples. T. 1. R 17

14, 967

McGrath, J. J., Harabedian, A. & Buckner, D. N. HUMAN FACTOR PROBLEMS IN ANTI-SUBMARINE WARFARE. REVIEW AND CRITIQUE OF THE LITERATURE ON VIGILANCE PERFORMANCE. Contract NONR 2649(00), NR 153 199, Tech. Rep. 1, Dec. 1959, 100pp. Human Factors Research, Incorporated, Los Angeles, Calif.

This review summarizes systematically what is known about vigilance performance and identifies problems requiring additional research. The several parts of the report are: 1) definitions and measurements, 2) review and critique of studies of vigilance performance, 3) theories of vigilance performance, and 4) conclusions and implications. An annotated bibliography of the experimental literature is included. R 70 (approx.)

14, 968

MacCanon, D. M. EFFECTS OF OXYGEN INHALATION ON COLD PRESSOR RESPONSES OF MAN. Contract DA 49 007 MD 1008, Sept. 1959, 8pp. University of South Dakota, Vermillion, S.D.

To determine whether oxygen inhalation would alter the responses of the cardiovascular system to the external stimulus of the cold pressor test, ten subjects were

tested. Blood pressures and pulse rates were determined in 28 experiments, before, during, and after immersion of the right hand in cold (4 degrees C) for one minute. Air or 100 percent oxygen was inspired throughout the test. The blood pressures and pulse rates were compared for oxygen and for air inhalation. Differences between basal values and changes from basal values resulting from cold pressor responses were analyzed. R 8

14, 969

Lord, F. M. STATISTICAL INFERENCES ABOUT TRUE SCORES. Psychometrika, March 1959, 24(1), 1-17. (Educational Testing Service, Princeton, N. J.).

Formulae are derived for unbiased sample estimators of any raw or central moment of the frequency distribution of true test scores. A general method is developed for obtaining from each examinee's observed score a least squares estimate of his true score. G. R 16

14, 970

Kydd, G. H., Fenichel, R. L. & Crosbie, R. J. G TOLERANCE IN PRIMATES. II. OBSERVATIONS ON THE RELATIONSHIP OF CAROTID PRESSURE AND END POINT DURING ACCELERATION. Proj. NM 11 01 12.9, NADC MA 5903, Rep. 2, May 1959, 14pp. USN Air Development Center, Johnsville, Penn.

Observations were made simultaneously of the occurrence of an end point of unconsciousness and carotid pressure in Rhesus monkeys during centrifugation. Closed circuit television and a film record were used for behavioral observations. Centrifuge runs began at a level of 1.9 g and increased to about 12 g. The significance of the findings is discussed with respect to the blood supply. T. G. R 6

14, 971

Kurtz, A. K. AN APPLICATION OF LEARNING THEORIES TO THE TRAINING OF RADIO CODE OPERATORS. Contract NONR 2519(00), Tech. Rep. 2, Sept. 1959, 16pp. The Psychological Corporation, New York, N. Y.

To determine the relative merits of two experimental and one control method of training radio code operators, seven successive classes of 60 students entering the United States Naval Training Center, San Diego, California, were studied. Each class was divided into three sections; students were matched, if possible, on the basis of their Radio Code Aptitude Test scores. Using a list of learning principles, methods were devised to facilitate learning and employed in the first four weeks of the 24-week course for one section, in the first two weeks

for a second section, and the third group was taught in the standard manner. Appropriate code receiving tests were devised and administered at end of third week and every even-numbered week thereafter. Test results were analyzed for effects of teaching method. T. R 8

14, 972

Kulp, C.M. & Rowland, G.E. DETECTABILITY OF NAVAL AIRCRAFT BY VISUAL MEANS. MEASURES TO INCREASE OR REDUCE; DEVELOPMENT OF: DAY-LIGHT VISUAL TARGET DETECTION (A SEARCH AND REVIEW OF THE LITERATURE). Contract N 156 37937, TED NAM AE 42222, Part 1, NAMC ACCEL 408, R & C Rep. 59 111, July 1959, 111pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

Parameters of visual target detection were drawn from recent visual literature. The importance given to these parameters in the literature was outlined. Specific emphasis was given to the influence that various aircraft exterior paint finishes would have in maximizing target detectability. Environmental and physical variables that might influence visibility were selectively reviewed. General and specific problem areas that appear to merit investigation were outlined. An appendix lists citations about half of which are annotated; both military and civilian literature are included. R 476

14, 973

Kruger, L.V. PITCH EXTRACTION FOR SPEECH SYNTHESIS WITH SPECIAL TECHNIQUES FOR USE IN DIGITIZED BAND-WIDTH COMPRESSION SYSTEMS. Proj. 4602, AFCRC TR 59 116, March 1959, 47pp. USAF Communication Sciences Lab., AFCRC, Bedford, Mass.

Pitch channel techniques for voice compression systems are reviewed and comparisons made between time and frequency domain methods for pitch extraction. The problem of extracting pitch from band-limited circuits which have no fundamental is treated. Techniques for improving the rise and fall resolution of the inverted pitch analog signal are shown. Digital transmission of pitch channel information at rates below 150 bits per second is discussed. A hiss-buzz segmenter is described, its uses indicated, and a special reduction technique in digital signal transmission is given. Tracking requirements for a universal pitch extractor are discussed and the channel used in the AFCRC Scanvocoder described. T. I. R 57

14, 974

Kreider, M.B., Buskirk, E.R., Iampletro, P.F. & Bass, D.E. EFFECT OF

CONTINUOUS COLD EXPOSURE ON NOCTURNAL BODY TEMPERATURE OF MAN, Proj. 7 83 01 006, Tech. Rep. EP 117, July 1959, 6pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

To determine whether nocturnal body temperatures are modified when men live continuously in the cold under controlled laboratory conditions uncomplicated by activity and clothing, five men were studied over a period of 42 days. Cold stress consisted of living at 60 degrees F., wearing only shorts, for 14 days. This cold period was preceded and followed by two weeks at 80 degrees F. Activity and diet were the same throughout; one blanket was used at night. Rectal and skin temperatures were measured periodically during both day and night. The 24-hour patterns of body temperature were studied and comparisons made between those taken the first two and the last two days of the stress period to check on acclimation effects. G. R 6

14, 975

Kurtz, A.K. RECENT DEVELOPMENTS, PRACTICES, AND RESEARCH IN THE FIELD OF CODE LEARNING. Contract NONR 2519(00), Tech. Rep. I, Sept. 1959, 52pp. The Psychological Corporation, New York, N.Y.

This review of research in code learning is devoted predominantly to those publications that have appeared in 1950 or later; some exceptions are made for a few classic and comprehensive studies. Special emphasis is given to those few studies concerned with "second-level" or advanced training. Topics covered are transmission speeds for code-reception practice, tone speed, order of signal presentation, rate of introduction and grouping of signals, amount of practice per signal, types of practice materials, code-voice method, learning theory, arrangement of practice time, progress in code learning, errors, accuracy standards, variety and antimonotony procedures, prediction of success, code sending and typing, and criteria of proficiency. R 45

14, 976

Kristofferson, A.B. & O'Connell, R.H. THE DETECTABILITY OF TARGETS CONTAINING INTERNAL LUMINANCE GRADIENTS. Proj. MICHIGAN, Rep. 2144 297 T, Sept. 1958, 9pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

Detection thresholds were measured for 13 non-uniform targets consisting of a circular area approximately 60 minutes in diameter, on the center of which a circular luminance increment approximately four minutes in diameter was superimposed. The ratio of center to annular luminance ranged between 1.0 and infinity. Predictions of the

luminance of the center area required for the entire target to be at detection threshold were made on the basis of several variants of the element contribution hypothesis, using values of threshold luminance of center and of annulus presented singly. The results from three observers were compared with the predictions. T. G. R 9

14, 977

Hodge, D.C. EFFECTS OF VARIATION IN RIFLE SIGHTING RADIUS ON AIMING ERRORS UNDER TWO LEVELS OF ILLUMINATION. Engng. Indust. Psychol., April 1959, 1(1), 40-48. (University of Rochester, Rochester, N.Y.).

To evaluate the effects of variations in rifle sighting radius on aiming errors under two levels of illumination, 60 ROTC cadets were tested in a laboratory environment. A range of six sighting radii from 12 to 42 inches were examined under illumination levels of 50 and one footcandles. The apparatus permitted the subject to align the mirror image of a target with a set of fixed M1 rifle sights and to mark a score sheet when alignment was subjectively correct. Both variable and constant errors were analyzed for the effect of the experimental variables. T. G. I. R 10

14, 978

Garner, W.R. CONTEXT EFFECTS AND THE VALIDITY OF LOUDNESS SCALES. Contract N5 ORI 166, Proj. NR 145 089, Rep. 166 1187, June 1954, 20pp. USN Office of Naval Research, Washington, D.C. (Psychological Lab., Johns Hopkins University, Baltimore, Md.).

To determine to what extent half-loudness judgments made with a method of constant stimuli can be influenced by the context of the stimuli presented to the observer, each of three groups of observers was given a different non-overlapping range of variable stimuli to be judged with respect to a standard stimulus. For each observer an intensity value for half judgment was computed by linear interpolation on the psychophysical function to determine an intensity equivalent to half of the judgments being more than half as intense. Such a value was computed for the first half, the second half, and for the complete series. The means, medians, and standard deviations were compared. Individual differences on judgments were compared. T. G. R 9

14, 979

Greene, P.H. FACTORS IN VISUAL ACUITY. Contract AF 18(600) 1454, Proj. 9777, AFOSR TR 58 85, Aug. 1958, 114pp. USAF Office of Scientific Research, Washington, D.C. (Committee on Mathematical Biology, University of Chicago, Chicago, Ill.).

A study is made and an interpretation is suggested for experimental findings (1) on the location of perceived contours in studies of Mach bands (sharply defined subjective bands seen in continuous luminance distributions), (2) irradiation (change in apparent width of a bar with changes in luminance), and (3) resolution distance (minimum distance separating two bars which can just be perceived as separate). Experiments are proposed to test the interpretation. G. I. R. 38

14, 980

Carterette, E.C. & Cole, M. REPETITION AND CONFIRMATION OF MESSAGES RECEIVED BY EAR AND BY EYE. Contract NONR 233(58), (NR 170 282), Tech. Rep. 3, June 1959, 18pp. Dept. of Psychology, University of California, Los Angeles, Calif.

To compare the auditory and visual modes of reception over successive repetitions of a message, a rating method was used to obtain receiver operating characteristics (ROC) for 60 heterogeneous words. A single message was sent under difficult conditions of reception and was repeated until it had been assigned the highest accuracy category on the rating scale or until it had been sent a maximum of six trials. The accuracy of reception for both modes was analyzed as a function of confidence rating and intelligibility level. T. G. R 14

14, 981

Basore, B.L. REDUNDANCY FOR IMPROVING ACCURACY IN COMMUNICATIONS. Contract AF 19(604) 4078, AFRCR TR 59 170, June 1959, 41pp. Dikewood Corporation, Albuquerque, N.M.

A study of the role of redundancy in communication was carried out principally in terms of an n-dimension model of message space. An effort was made to determine an intuitively clear method of comparing the significance of redundancy in reducing error rates in a communication link with the contribution realized through the use of long messages and delay. Conclusions were drawn with respect to cost of communications in relation to channel capacity usage. R 11

14, 982

Boiten, G.G. ASSESSMENT OF VIBRATION NUISANCE. UDC 53+831, Trans. 695, Oct. 1957, 5pp. Royal Aircraft Establishment, Farnborough, Hants, England.

This paper contains a brief statement of methods of analyzing a particular vibration spectrum or pattern into zones as a preliminary step in assessing the vibrational nuisance level of a particular source of vibration. T. G. R 1

14, 983

Townsend, F. M. THE UTILIZATION OF PATHOLOGY IN AIRCRAFT ACCIDENT INVESTIGATION. Reprint from: "Medical Aspects of Flight Safety." AGARD. 30, 1959, 9pp. Pergamon Press, New York, N. Y. (USAF Institute of Pathology, Washington, D. C.).

Aircraft accidents continue to be a problem within the United States Air Force. The contribution of the pathologist to the field of flight safety is discussed. It is stressed that an investigation by the pathologist should encompass all the many factors which affect the "man-aircraft" relationship. The approach to this field is characterized as a consideration of 1) environmental factors, 2) traumatic factors, and 3) pre-existing disease. Several case histories are given to illustrate the need for continuing research in the first and last areas. Air Force recommended procedures for the Medical Investigation of Aircraft Accident Fatalities are reviewed in light of the duties of the pathologist. R 15

14, 984

Slecht, R. F., Forrest, J., Carter, W. K. & Wade, E. A. COMFORT EVALUATION OF THE C-124 CREW SEAT (WEBER). ONE OF A SERIES OF STUDIES PERTAINING OF THE DESIGN EVALUATION OF PILOT AND CREW STATION EQUIPMENT. Contract AF 33(616) 3068, Proj. 7215, Task 71724, WADC TR 58 316, Oct. 1959, 15pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University, Medford, Mass.).

To evaluate certain design characteristics of the C-124 Crew Seat (Weber) in terms of their adequacy for the maintenance of human comfort, 17 subjects were tested during a voluntary sitting period of seven hours' maximum duration. Subjective and behavioral laboratory tests were administered at hourly intervals using a questionnaire type of comfort rating for overall comfort and for comfort of specific body regions. Following termination of the sitting period (termination was at the will of the subject up to the seven hour period), final comfort ratings and individual seat parts ratings were completed by all subjects. On the basis of test data and specific comments made by subjects, recommendations for seat design improvement are made. T. G. I. R 1

14, 985

Rosenblatt, F. THE PERCEPTRON A THEORY OF STATISTICAL SEPARABILITY IN COGNITIVE SYSTEMS. Contract NONR 2381(00), Proj. PARA, Rep. VG 1196 G 1, Jan. 1958, 262pp. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y.

The theory of statistical separability and the design of the perceptron (electronic brain model) which are presented in this report originated from a series of studies of memory trace mechanisms in the central nervous system. This report constitutes the basic theoretical exposition of the theory. Following an introductory discussion, the following topics are developed: stimulus sampling and perceptual generalization, basic organization of the perceptron, equations of statistical separability (analysis of the predominant phase; the post-dominant phase for an ideal environment; in differentiated environments), bivalent enforcement systems, temporal pattern recognition, methods of figural analysis, cognitive sets, and selective recall. G. I. R 23

14, 986

Rees, D. W. & Copeland, Nola K. THE EFFECTS OF SERIAL POSITION IN CHECK-LIST DESIGN. Proj. 7184, Task 71586, WADC TR 59 552, Sept. 1959, 17pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

An experiment was conducted to determine 1) whether serial position effects occur in the use of check-lists, and 2) whether these effects can be modified. Subjects responded to a serial presentation of instructions by actuating switches. Two check-lists of instructions were tested: a high and a low generalization list. The two criterion measures of performance were time spent observing the list (search time) and number of errors made. The data were studied by analysis of variance. T. G. R 6

14, 987

Reza, F. M. BASIC CONCEPTS OF INFORMATION THEORY FINITE SCHEME. Contract AF 19(604) 2452, Scientific Rep. 2 AFRC TN 59 588, SURI Rep. EE 507 599S 2, Sept. 1959, 75pp. Syracuse University Research Institute, Syracuse, N. Y.

The basic elements of information theory of discrete channels is presented in a manner parallel to the presentation of the elements of discrete probability theory. A measure for information content of a discrete system is developed and used for evaluating the rate of transmission of information in a communication system. The approach is mathematical rather than philosophical with emphasis on logical clarity. The method of presentation should prove of some interest to scientists and engineers who wish to acquire some introductory knowledge of the subject. G. I. R. 14

14, 988

Pollack, M. TECHNICAL STUDIES IN CARGO HANDLING - V THE EFFECT OF COMMUNICATION ON A N-STAGE

SHUTTLE PROCESS. Contract NONR 233(07), Rep. 58 43, May 1958, 20pp. Dept. of Engineering, University of California, Los Angeles, Calif.

In this paper a simple communication model is presented. This model is used for estimates of the effect of communication on an N-stage shuttle process using the data from a previous simulation study of the process. The functional relationship between effectiveness and balance allowance (average delay) is determined. Balance allowance values from the simulation study and from a study of a large amount of actual cargo handling data are compared. For these values of balance allowance, the corresponding values of coefficient of variation used in the simulation study are obtained. G. I. R 5

14,989

Pollack, M. AN ENGINEERING ANALYSIS OF CARGO HANDLING-VII SOME STUDIES ON SHUTTLE AND ASSEMBLY LINE PROCESSES. Contract NONR 233(07), Rep. 58 12, Feb. 1958, 41pp. Dept. of Engineering, University of California, Los Angeles, Calif.

Two types of flow processes are described and formulated—a shuttle and an assembly line process. Variations of each are studied for the general N-stage condition. The shuttle process is considered for multiple shuttles per stage, storage capacity at the nodes, and the combination of multiple shuttles per stage with storage capacity at the nodes. The assembly line process is considered for multiple machines per stage both with and without set-up times included. The mathematical method of recurrence relations is used to formulate these relations for the various significant variables (delay and arrival times of items at various positions) of both processes. A bibliography of recent studies in queueing theory and assembly line analysis is included. T. I. R 45

14,990

Mori, Gina F. IS IT POSSIBLE TO MEASURE THE CONTRAST ENHANCEMENT OF A FIGURE WITH "QUASI PERCEPTIVE CONTOURS"? Atti Della Fondazione Giorgio Ronchi, March-April 1959, XIV(2), 137-139.

A figure with quasi-perceptive contours is described as one where a figure is seen as superimposed upon the paper where other figures are drawn (stratification effect). One such figure is illustrated in which an equilateral triangle, whose vertices coincide with the centers of three black circles from which a sector has been removed, is seen as superimposed upon another triangle having its vertices (drawn in black) at points between the three circles. An explanation of this effect is offered in

terms of contrast enhancement effect and measurement of this effect was attempted. Differential thresholds were determined at various points near the perceived border or contour, both inside and outside the figure. The data were compared for differences in luminance between figure and background. T. I. R 4

14,991

Trask, C.H., Christensen, M.K., Cresthull, P., Oberst, F.W., et al. AN ESTIMATION OF THE PER CENT MILITARY EFFECTIVENESS OF SOLDIERS WITH VARIOUS DEGREES OF INCAPACITATION FROM GB VAPOR IN VARIOUS TACTICAL SITUATIONS. Proj. 4 08 02 023, Subproj. 4 08 02 023 04, CWLR 2294, Aug. 1959, 12pp. USA Chemical Warfare Labs., Army Chemical Center, Md.

The severity of poisoning by GB (nerve gas) vapor in man is defined in terms of the nature and extent of toxic signs and symptoms from animal data and a review of literature on accidental and experimental human exposures. Estimates of the frequency of poisoning by various Ct exposures to GB vapor are presented for mild, moderate, severe, very severe, and lethal effects. The per cent military effectiveness in four tactical situations is estimated for soldiers with these degrees of poisoning. T. G. R 7

14,992

Ten Cate, W. APPENDICES TO REPORT 147 (MAY, 1953) ON VIBRATION NUISANCE. (AANVULLING OP RAPPORT 147: TRILLINGSHINDER). Trans. 694, Oct. 1957, 10pp. Royal Aircraft Establishment, Farnborough, Hants, England.

This report contains comments on 12 papers pertaining in some way to whole body vibration. Some of the results are presented in graphic form. T. G. R 12

14,993

Ward, J.E., Hawkins, W.R. & Stallings, H.D. PHYSIOLOGIC RESPONSE TO WEIGHTLESSNESS INITIATION OF MICTURITION. Rep. 59 35, Aug. 1959, 5pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

To study the effect of the null-gravity state on elimination of liquid body rates, 26 subjects were exposed to a total of 37 separate jet aircraft flights during which zero-gravity parabolic flight maneuvers were performed. The capability of the subjects to initiate micturition during weightlessness following a period of hydration was studied. T. I. R. 3

14,994

Wolf, E. & Zigler, M.J. SOME RELATIONSHIPS OF GLARE AND TARGET PERCEPTION. Contract AF 33(616) 3305,

IV 256

Proj. 7186, Task 71551, WADC TR 59 394, Sept. 1959, 29pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Visual Research Lab., Wellesley College, Wellesley, Mass.)

This study was carried out to describe quantitatively the relationship between the luminance of a glare source and threshold luminance of a test target when both are varied in angular subtense and distance from each other. The threshold visibility of the test target was determined for various sizes and luminances of the glare source, various angular separations between the two, and for various exposure times and retinal locations. Threshold luminance for the readability of Landolt rings, letters, and dials were similarly determined. T. G. I. R 18

14,995

Waldron, D. L. A STUDY OF THE REFERENCE AND 90-DAY AUDIOGRAMS OF A GROUP OF AIR FORCE AIRCRAFT AND ENGINE MAINTENANCE MEN. Rep. 59 96, Oct. 1959, 13pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

The reference and 90-day audiograms of a group of aircraft and engine maintenance men were examined and analyzed separately and comparatively. Both audiograms were displayed by overall hearing classification as determined by the individual's poorer ear and by left ear versus right ear hearing class. Mean and median audiograms were computed by age groups. The 90-day follow-up audiograms for the left ear were compared with the reference audiograms for 303 of these men. T. G. R 7

14,996

Simons, J. C. WALKING UNDER ZERO-GRAVITY CONDITIONS. Proj. 7184, Task 71585, WADC TN 59 327, Oct. 1959, 8pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

This is the first report on experiments with permanent magnetic sandals that enable a man to walk with an approximately normal gait under weightless conditions. Four subjects were observed as they attempted to initiate self-locomotion while in the weightless condition produced aboard a C-131b aircraft during the zero-g maneuver. Subjects reported upon their orientation perceptions during this period. A basic index was formulated to define magnetic requirements in terms of the inductive forces required to hold a subject stationary. A vector analysis of the 1-g walking gait was made. Further studies are proposed. R 3

14,997

Spano, L. A. & Bailey, T. L. AUXILIARY HEATING SYSTEMS FOR COMBAT CLOTHING. Proj. 7 93 30 601, QMRE TR

20, (APO 1), July 1959, 60pp. USA Textile, Clothing & Footware Div., QM Research & Engineering Command, Natick, Mass.

The results of a re-examination by the Quartermaster Corps of the environmental protective properties of present clothing systems for troops operating in Arctic climates are given. The examination was conducted with reference to 1) what degree of protection is now provided, 2) what can be anticipated in the immediate future, and 3) what programs must be initiated to answer unsolved problems. On the basis of the findings, a research program is outlined: 1) development and evaluation of auxiliary heating systems for rewarming troops exposed to deep cold, 2) development of auxiliary heating devices and systems for the extremities, and 3) design and development of a combat clothing ensemble provided with an integral auxiliary heating system.

T. G. I. R 15

14,998

Schutz, W. C. STUDIES IN GROUP BEHAVIOR. I. CONSTRUCTION OF HIGH PRODUCTIVITY GROUPS. Contract NONR 494(03), Proj. NR 145 088, Rep. 1953 494 03 04, Aug. 1953, 50pp. Tufts University, Medford, Mass.

This report is concerned with the prediction of group productivity from individual personality measures of group members. A theoretical background relevant to such prediction was developed and a personality test constructed to measure personality dimensions. A technique for constructing compatible and incompatible groups was developed and used to select eight five-man groups—four predicted to be compatible and four incompatible. Each group performed three tasks varying in amount of cooperation required and each task repeated with an increasing amount of time pressure during ten different sessions. Sound motion pictures were taken of all groups. The observed results (measures of performance) were studied in relation to predictions. Leadership relations are discussed. T. R 18

14,999

Fitts, P. M. (Ed.). NOTES AND SELECTED READINGS ON HUMAN ENGINEERING CONCEPTS AND THEORY. Aug. 1959, 710pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich.

There are two major parts in this volume on Human Engineering. The first part is in outline form and covers lectures and papers on the following general topics: human factor engineering—an overview of concepts and theory; survey and analysis of human factor engineering problems in selected systems; recent advances in simulation and

15,000

measurement; special topics; special environmental problems and stress effects; general psychological theory relevant to human factor engineering; and laboratory projects. The second part contains 37 selected original papers and research reports of pertinence to the above topics. The whole comprises an intensive course for practicing engineers and scientists. T. G. I. R 700 (approx.)

15,000

Stevens, S.S. MACHINES CANNOT FIGHT ALONE. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 12pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich. (Reprinted from: Amer. Sci., 1946, 34(3), 389-400).

This article discusses the factors in World War II which made new demands upon man's sensory equipment. The subsequent accomplishments of the psychophysicist in solving new problems created by new devices in this machine-age war are recounted: eyes and radar screen, psychophysics and radar engineering, insignia for the eye to see, fighting in the dark, muscles and skills, communications, and packaging speech. The future of this combination of science and human engineering is questioned.

15,001

Brogden, W.J., Fitts, P.M., Imus, H. & Stevens, S.S. HUMAN ENGINEERING IN THE NATIONAL DEFENSE. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 9pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich.

The demand for human engineering and psychophysiology in the national defense is discussed. Human engineering is defined as engineering for human use and the specialties of the field are detailed. The military goals of human engineering, the military fields of its application, the optimum employment of men as components in future weapons systems, and problems of basic and supporting research are discussed.

15,003

Fitts, P.M., Schipper, L., Kidd, J.S., Shelly, M. et al. SOME CONCEPTS AND METHODS FOR THE CONDUCT OF SYSTEM RESEARCH IN A LABORATORY SETTING. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 14pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich.

This paper reviews the concepts and methods, and some selected results of an experimental program that has been investigating such system-design problems as allocation of functions between men and machines, planning work loads of individual operations, and the

optimum coupling of men and machines. The specific system under study has as its function the safe and efficient control of aircraft in the terminal (approximately 50-mile radius) area around an airport. The lines of future research are discussed. T. G. I. R 16

15,004

Chapman, R.L. & Kennedy, J.L. THE BACKGROUND AND IMPLICATIONS OF THE SYSTEMS RESEARCH LABORATORY STUDIES. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 9pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich.

The aims of the Systems Research Laboratory (The RAND Corporation) are set forth as the development of means of evaluating group performance, identifying the organization, and finding the best policies, procedures and training methods. The type of study and the methodology used by this Laboratory is discussed and some results of experiments with air-defense organizations are discussed. A model of organizational behavior developed from the studies is discussed along with the implications for studying broader areas of human endeavor. G. I.

15,005

Henneman, R.H. VISION AND AUDITION AS SENSORY CHANNELS FOR COMMUNICATION. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 6pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich. (University of Virginia, Charlottesville, Va.). (Reprinted from: Quart. J. Speech, April 1952, 38(2), 161-166).

This article suggests and describes an approach toward finding the answer to an interesting and practical question in communications—the problem of specific conditions that determine the relative effectiveness of receiving information through the visual and auditory senses. A theoretical analysis of the two senses from the experimental psychology of visual and auditory perception yielded several hypotheses amenable to experimental testing. One such investigation is described in which the "attention-demandingness" of messages presented aurally and visually was made. T. R 2

15,006

Geldard, F.A. ADVENTURES IN TACTILE LITERACY. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 9pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich. (Reprinted from: Amer. Psychol., March 1957, 12(3), 115-124).

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The possibilities in using the cutaneous senses to serve as an efficient communication network are discussed in this paper. Some experimental use of electrical stimulation is described. The major portion of the article is then devoted to mechanical stimuli and a description of a series of experiments that has established the useful dimensions of vibratory stimuli and a vibratory communication system that has been put together. Experiments involving the learning of the vibratese language are described, and various problems in using such a language are discussed. G. I. R 10

15,007

Grether, W. F. DESIGN OF INSTRUMENT DIALS FOR EASE OF READING. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 8pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich. (Reprinted from: SAE Quart. Trans., Oct. 1948, 2(4), 539-545, 562).

A survey of some of the psychological research aimed toward improvement in ease of reading of aircraft and other instrument dials is presented. The need for such studies is illustrated through a discussion of pilot errors in instrument reading followed by sections on how instruments are read, studies of check reading, studies of qualitative reading and studies of quantitative reading. Future needs are indicated. T. G. I. R 13

15,008

Taylor, F. V. EQUALIZING THE SYSTEM FOR COMPONENT "H". From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 12pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich. (USN Research Lab., Washington, D. C.).

This paper describes four areas of attack on the problems of adjusting the physical characteristics of man-machine systems to achieve greater stability and reduced error. These are transduction, coding, minimization, and desensitization. Examples from each area are described in which one or more human operators are essential elements in the control loop of the system. Possibilities for using this kind of thinking in more complex systems are discussed. G. I. R 6

15,009

Versace, J. SUBJECTIVE MEASUREMENTS IN ENGINEERING. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 28pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich.

After pointing to the fact that human judgment is involved in all kinds of measurements, subjective measurements are defined

as those measurements, notably ratings, which cannot be reproduced very closely. The use of such measurements in engineering is illustrated with many examples. The way in which reliability limits the precision of matching a rating with any other measurement is discussed. It is pointed out that basic magnitudes may be still more useful than ratings even if the relationship is poor. The need to use experimental testing to establish valid basic magnitudes is then discussed. R 31

15,010

Garvey, W. D. & Taylor, F. V. THE USE OF "ARTIFICIAL SIGNALS" TO ENHANCE MONITORING PERFORMANCE. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 14pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich. (USN Research Lab., Washington, D. C.).

This report describes a series of experiments on the behavior of human monitors searching over a two-hour period for signals which appear infrequently on one or another of several dials. Products of modern technology (radar nets, computers, reactors, satellites, etc.) impose many monitoring tasks of this sort. The purpose of the experiments was to determine the effect of frequently inserting "artificial" signals on the detection of infrequently occurring "real" signals. In some conditions the subject could distinguish between the two kinds of signals and in others he could not make the distinction. Both informational (red lights) and motivational (noise) feedback were used in different experiments to determine their value in measuring efficiency. T. G. I. R 8

15,011

Teichner, W. H. ENVIRONMENTAL FACTORS AFFECTING HUMAN PERFORMANCE. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 32pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich. (University of Massachusetts, Amherst, Mass.).

The importance of environmental factors in a man-machine environment is discussed and three general classes of environmental problems are defined: completely uncontrolled or stress environment, partially controlled, and completely controlled. A variety of environmental factors is then discussed to show how they affect man-machine systems and to indicate the present status of knowledge with regard to them: temperature, humidity, air movement; noise and vibration; speed, acceleration, motion; altitude, atmospheric pressure; noxious and toxic factors; ionizing radiation; and outer space problems.

15,012

Emphasis is placed on providing a summary useful to design engineers. A list of selected references is provided. G. I. R 96

15,012

Tanner, W.P. Jr., Birdsall, T.G. & Clarke, F.R. THE CONCEPT OF THE IDEAL OBSERVER IN PSYCHOPHYSICS. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 28pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich.

Some of the factors that must be considered by an observer in arriving at a decision are discussed; the concept of an ideal observer is introduced and contrasted with the more typical descriptive model. The model of the ideal observer is then considered as a tool in arriving at descriptive models of sensory systems. The main sections of the paper are devoted to development of the general theory of the ideal observer, of the case of a signal known exactly in band limited white Gaussian noise, and of the model of the ideal observer. G. I.

15,013

Walker, E.L., Kincaid, W.M. & Foster, Harriet W. A GENERALIZED MATHEMATICAL MODEL OF HUMAN PERFORMANCE (WITH SPECIAL REFERENCE TO THE MISSILE MASTER AIR DEFENSE SYSTEM). From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 40pp. College of Engineering Summer Session, University of Michigan, Ann Arbor, Mich.

This paper presents a generalized quantitative description of human performance that has two important properties. It is compatible in form with the mathematical model of the AN/FSG-1 air defense system and thus permits evaluation of human performance characteristics in terms of their over-all effects on system performance. Secondly, it permits simultaneous incorporation of modifications in human performance in comparable terms whether they originate in changes due to such factors as personnel selection, training or procedural revision on the one hand or modifications of equipment design and functioning on the other. Some empirical data on operator performance in the AN/FSG-1 is presented and some general specifications of needed human factors research on the system are indicated. T. G. I.

15,014

Helson, H. DESIGN OF EQUIPMENT AND OPTIMAL HUMAN OPERATION. From: "Notes and Selected Readings on Human Engineering Concepts and Theory," Aug. 1959, 26pp. College of Engineering Summer Session, University of Michigan, Ann Arbor,

Mich. (Reprinted from: Amer. J. Psychol., Oct. 1949, LXII(4), 473-497).

The first part of this article summarizes results from studies conducted during World War II at the Foxboro Company on anti-aircraft fire-controls. The aim of the research was to discover not only how such variables as speed of turning (handwheel controls) and size and weight of handwheels interact to affect human performance (tracking) but also to determine what general principles govern behavior under such conditions. In the second portion, some broad generalizations derived from the work regarding sensorimotor performance are proposed, and the implications for design of machines with resultant improvement in efficient human performance are discussed. T. G. I. R 1

15,015

Pepinsky, P.N. & Pepinsky, H.B. ORIGINALITY IN GROUP PRODUCTIVITY. Contract NONR 495 (15) (NR 170 396), Proj. RF 798, Tech. Rep. 4, Nov. 1958, 18pp. Ohio State University Research Foundation, Columbus, Ohio.

This is an annual report of accomplishments on a research study designed to identify and measure behaviors that are independent and original, but contribute to group productivity, and to determine the conditions leading to such behaviors. The summary includes a specific statement of the problem, work accomplished, work in progress, and immediate plans. R 5

15,016

Kinkade, R.G. & Kidd, J.S. THE USE OF AN OPERATIONAL GAME AS A METHOD OF TASK FAMILIARIZATION. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 59 204, July 1959, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Laboratory of Aviation Psychology, Ohio State University & Ohio State University Research Foundation, Columbus, Ohio.).

An evaluation of the usefulness of an operational game as a system task-familiarization device was attempted. A sample of 20 subjects was divided into two groups after completion of skill component training. One group was given five hours of practice on an operational game derived from radar air traffic control task. The other group went directly into system training on an end task provided by an electronic air traffic control simulator. Comparison was made of the two groups' proficiency during system training on the end task during a final six-hour training period. R 8

15,017

Black, J.W. PREDICTING THE CONTENT OF SHORT PHRASES. Contract NONR 495(18), NR 145 993/6 16 59, RF Proj. 1002,

Rep. 88, Jan. 1959, 5pp. Ohio State University Research Foundation, Columbus, Ohio. (Reprinted from: Quart. J. Speech, Oct. 1959, XLV(3).).

To study the predictability of the content of short phrases under three conditions (type of material, knowledge of source of material, and units of different length and position), approximately 100 new students in the naval flight training program were required to guess successive letters of the text until the correct letter had been found. Two samples of the printed language were selected: phrases from flight instruction and from newspapers. Each phrase contained five syllables and 3, 4, or 5 words. One half of the subjects were told the source of each phrase; the remainder were told that all phrases were "newspaper language". Mean percentage of correct first guesses through all letters and spaces and amounts of information (in bits) per space were analyzed for the effects of the experimental conditions. T. R 5

15,018

Harris, J.G., Jr. A STUDY OF VISUAL-AUDITORY CONFLICT INVOLVING THREE STIMULI. Res. Proj. NM 14 01 11, Subtask 7, Rep. 2, June 1959, 31pp. USN School of Aviation Medicine, Naval Air Station, Fla.

Conflicting and similar visual and auditory stimuli were presented in random manner to 10 subjects. The visual stimuli were either three geometric forms with a printed name of one of the forms or three colors with the printed name; the auditory stimulus was the spoken name presented simultaneously with the visual stimulus. The task was to respond by pressing the appropriate key: all the same, all different, or one of the three was in disagreement with the other two. Response times and errors were recorded and analyzed for differences among response categories and stimulus types. Several possible applications of the experimental method are discussed. T. I. R 1

15,019

Graybiel, A., Clark, B. & Zarriello. J.J. OBSERVATIONS ON HUMAN SUBJECTS LIVING IN A "SLOW ROTATION ROOM" FOR PERIODS OF TWO DAYS: CANAL SICKNESS. Res. Proj. MR005.13 6001, Subtask 1, Rep. 49, Oct. 1959, 38pp. USN School of Aviation Medicine, Naval Air Station, Fla.

To investigate the consequences of prolonged constant rotation of human subjects living in a slow rotation room, five healthy subjects and one control (loss of vestibular function) subject were studied. The nearly circular, windowless room was constructed around the center post of a centrifuge which

was rotated at rates varying from 1.71 to 10.0 rotations per minute for periods of two days each. During each period, the subjects were engaged in a series of tasks designed to serve as stressors and at the same time give some measure of their performance. The results, presented and analyzed in this report, consist primarily of the symptoms reported by the subjects. Some inferences are drawn as to neurophysiological mechanisms involved. T. G. I. R 20

15,021

Nadel, A.B. SUPPORTING MAN IN SPACE: 1970-1975. RM 59TMP 85, Nov. 1959, 47pp. Technical Military Planning Operation, General Electric Company, Santa Barbara, Calif.

This report discusses progress in space technology that is expected to take place by 1970 and anticipates several bold adventures into space during the period 1970-1975, such as successful trips to the moon and the beginning of interplanetary travel (Mars, Venus, etc.). Needed requirements and capabilities for such accomplishments are discussed in the following areas: 1) the physical environment--atmosphere, gravitational forces (acceleration and zero g), temperature, and radiation; and 2) acoustic noise and vibration. T. G. R 55

15,022

Silverman, R.E. THE COMPARATIVE EFFECTIVENESS OF ANIMATED AND STATIC TRANSPARENCIES. Contract N61339 78, NAVTRADEVCE TR 78 1, April 1958, 25pp. USN Training Device Center, Port Washington, N.Y. (New York University, New York City, N.Y.).

To compare the training effectiveness of animated and static transparencies, three training devices differing in the number of moving parts and three testing methods differing in their emphasis on verbal function were used. The subjects (150) were assigned at random to one of the three devices and, within devices, to either the animated or static training condition. Training was accomplished in small groups, each group being exposed to a standard tape recorded lecture and a particular visual device. Testing was done in groups for the written tests and individually for the performance test. Test results were analyzed for differences due to type of transparency, number of moving parts, and degree of verbal components in tests. T. I. R 2

15,023

Morris, F.M. THE INFLUENCE OF KINESTHESIS UPON NEAR HETEROPHORIA MEASUREMENTS. M.S. Thesis, Jan. 1958, 57pp. Indiana University, Bloomington, Ind.

To investigate the variability of three commonly used methods of measuring lateral

15,024

phoria at near (Prism Diplopia, Screen-Maddox Rod, Modified Thorington) and to determine to what extent manipulatory localization would affect the perceived or apparent localization of the target, measurements of lateral heterophoria at 40 centimeters were made on 40 subjects (20 trained and 20 untrained). Measurements were taken on two separate days using visual cues only and again on two other days using both visual and kinaesthetic cues (placing hands on target support and moving target beyond and in front of the testing distance). Differences due to tests, training of observers, and cues were analyzed. T. I. R 24

15,024

Busch, A. C., Trabold, F. W., Jr. & Sklodowski, V. A. BEHAVIORAL RESPONSE TO AUTOMOBILE TRAFFIC LIGHT PATTERNS. June 1959, 31pp. Human Factors Engineering Group, Avco Corporation, Cincinnati, Ohio.

To study the effects of providing additional cues to the automobile driver through the medium of traffic signal lights on the behavioral responses (decision time, stopping time), 26 subjects performed on an automobile simulator. The task was to drive and stop in response to a standard and three experimental traffic light patterns. Half of the group received indoctrination on the experimental systems while the other half received none. All subjects were given simulator practice. A detailed analysis was made of the objective differences in behavioral driving responses and the individual subjective preferences. The optimum signal light pattern is described. T. G. I. R 2

15,025

Caldwell, L. S. THE EFFECT OF THE SPATIAL POSITION OF A CONTROL ON THE STRENGTH OF SIX LINEAR HAND MOVEMENTS. Proj. 6X95 25 001, Task 03, Rep. 411, Dec. 1959, 42pp. USA Medical Research Lab., Fort Knox, Ky.

To determine the effect of control position on the force with which six linear hand movements could be made along the X, Y, and Z axes of an essentially isometric control, five subjects were employed. Measurements were made of the maximum force applied in a five-second period to a dynamometer handle by each of six linear hand movements. Maximum strength of each movement was measured at 80 control positions (five handle distances, four angular elevations, and four lateral positions). The data were analyzed by the method of orthogonal polynomials (explanation in appendix) and recommendations for optimum control positions are made. T. G. I. R 6

15,026

Pettie, C. R. THE LOUDNESS DIFFERENCE LIMEN FOR TONES IN NOISE. Proj. NM 22 01 20 02 01, XVII(9), Rep. 314, Aug.

1959, 5pp. USN Medical Research Lab., New London, Conn.

To determine whether loudness discrimination for tonal signals in a noise background is stable throughout a range of intensities, a forced choice variant of the constant stimulus method was used. A tone was presented in thermal noise to two experienced subjects. The differential sensitivity was explored for the tone at six levels (three to forty decibels) above the 50 percent recognition threshold in a broad band noise. The Difference Limen, 75 percent criterion, for a pure tone (1000 or 6000 cps) was established over the range of intensities used. These data were compared to previous data for listeners in a quiet situation. T. G. I. R 13.

15,028

Rulon, P. J. A STUDY OF THE ACCURACY OF RECOGNITION OF THE INCIPENT STALL IN FAMILIAR AND UNFAMILIAR PLANES. Rep. 74, Nov. 1947, 136pp. Civil Aeronautics Administration, Washington, D. C.

To investigate the accuracy of recognition of the incipient stall during flight with light aircraft, check flights were administered to subjects (student pilots, private pilots, and flight instructors) in aircraft equipped with stall warning indicators that were visible only to the check-pilot. During the execution of assigned maneuvers, subjects were directed to fly as close as possible to the edge of the stall without actually stalling the plane. Performance was judged by means of the warning indicators. On other flights the pilots were directed to fly normally; the check-pilot measured performance as before but without the subject being aware of the check. The results are discussed with respect to regulatory policies. T. I.

15,029

Douglas Aircraft Company, Inc. STUDY SPEC. - HUMAN ENGINEERING OF CONTROL SYSTEMS. July 1956, 14pp. Douglas Aircraft Company, Inc., El Segundo, Calif.

This specification defines the requirements for a human engineering study to determine the optimal control linkage between the human operator, the integrated instrument display system currently under development by the joint Navy-Army Instrument Development Program, and the airframe into which the integrated display system will be installed. A selected bibliography on control systems is included. R 75

15,031

Schaefer, K. E. RESPIRATORY PATTERN AND RESPIRATORY RESPONSE TO CARBON DIOXIDE. Proj. NM 24 01 20 01 01, XVII(6), Rep. 299, July 1958, 14pp. USN Medical Research Lab., New London, Conn.

(Reprinted from: J. appl. Physiol., July 1958, 13(1), 1-7).

To determine the cause of the marked individual variations in the respiratory response to carbon dioxide (CO₂), 65 subjects were exposed to various CO₂ concentrations (1.5, 3.3, 5.4, and 7.5 percent) for 15 minutes followed by a recovery period of equal length. Respiratory responses to CO₂ and to air were studied for relationships that might be present. The practical applications of the findings to the problem of personnel selection are discussed. T. G. R 24

15,032

Scodel, A., Minas, J.S., Ratoosh, P. & Pipetz, M. SOME DESCRIPTIVE ASPECTS OF TWO-PERSON NON-ZERO-SUM GAMES. Conflict Resolution, June 1959, III(2), 114-119. (Ohio State University, Columbus, Ohio).

This paper presents the initial results of a study of how people actually behave in game situations. Pairs of subjects played two-person non-zero-sum games and their behavior was recorded. Possible psychological determinants of the observed behavior are discussed. T. R 5

15,033

Schipper, L.M., Versace, J., Kraft, C.L. & McGuire, J.C. HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL II AND III: EXPERIMENTAL EVALUATIONS OF TWO IMPROVED IDENTIFICATION SYSTEMS UNDER HIGH DENSITY TRAFFIC CONDITIONS. Contract AF 33(616) -13, Proj. 7192, WADC TR 56 68, July 1956, 45pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

In two experiments, radar air traffic controller performance was investigated in simulated return-to-base problems at several traffic densities with two improved identification systems--the Clock Code omnipresent system using a symbolic code attached to each blip and the Light Pencil interrogator system which gave on-demand identification. The controller's environment included noise-free displays with an idealized lighting system. The basic problems were simulated return-to-base missions of jet and propeller-driven aircraft under instrument flight rules (IFR). Traffic densities ranged from 25 to 40 aircraft per hour. Various performance criteria were used in the analysis of the efficiency of the two identification systems. T. G. I. R 10

15,034

Stroud, R.C. COMBINED VENTILATORY AND BREATH-HOLDING EVALUATION OF SENSITIVITY TO RESPIRATORY GASES. Proj. NM 24 02 20 01 02, XVIII(10), Rep. 315, July 1959, 4pp. USN Medical Research Lab., New London, Conn. (Reprinted

from: J. appl. Physiol., May 1959, 14(3), 353-356).

To develop a method for measuring respiratory sensitivity to changes in oxygen (O₂) tension independent of change in carbon dioxide (CO₂) tension, a combined analysis of breath-holding and ventilatory data was made. Comparisons were made of experimentally determined responses of three subjects to various combinations of O₂ and CO₂ tensions with values predicted by the analysis. T. G. R 7

15,035

Veghte, J.H. & Webb, P. INFLUENCE OF PRIOR BODY COOLING WITH AIR ON HUMAN HEAT TOLERANCE. Proj. 7164, Task 71830, WADC TR 59 350, Sept. 1959, 13pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

To determine the feasibility of using a ventilating suit as a vehicle for body cooling prior to heat exposures, a series of experiments was conducted with three experienced subjects. During the cooling phase various ventilating air temperatures (30, 45, and 60 degrees F.), air flow rates (10, 20, and 34 cubic feet per minute), and time durations (30, 60, and 90 minutes) were explored with both light and heavy clothing assemblies. The heat phase consisted of sitting in a chamber held at a constant temperature of 160 degrees F. until tolerance (impending heat stroke) was reached. Results were expressed in several forms: an index of strain, body storage rates, tolerance times, terminal rectal temperatures, etc. Recommendations are made for optimal usage of the suit for extension of heat tolerance. T. G. I. R 6

15,036

Clarke, N.P. & Headley, R.N. STUDIES OF PRIMATE TOLERANCE TO SOME COMPLEX ACCELERATIONS. Proj. 7222, Task 71746, WADC TR 59 630, Nov. 1959, 8pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

Satellite vehicles during unstable re-entry into the denser portions of the earth's atmosphere may be subjected to complex accelerations. Five primates were exposed to simulated deceleration in the forward facing position of up to 20 g combined with sine wave pitch oscillations through half amplitudes of 20 degrees at three and five cps. Accelerations (headward-footward and forward-backward) were measured on the seat at head level and directly on the skull of one animal. Types of movement made by the animals after centrifugation were observed. Post-mortem examinations were made and are reported. T. G. I. R 4

15,037

Jeantheau, G. THE DIFFERENTIAL EFFECTS OF SPEED AND LOAD STRESS

ON TASK PERFORMANCE. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 59 7, July 1959, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

To investigate the effect of various levels of speed and load stress on performance in an information processing task, ten subjects were required to discriminate and report pairs of identical symbols within symbol matrices of various sizes (four rows and two, three, or four columns). Each matrix was referred to as a "message," the rows were "words," and the cells were "symbols." Five levels of presentation were used: 17, 20, 24, 30, and 40 messages per minute. Each subject served under all conditions, and performance was assessed both in terms of error scores and a derived information measure. The value of information measures in assessing tasks of this type is discussed. T. G. I. R 8

15,038

USA Infantry Human Research Unit, Fort Benning, Ga. IMPROVED SILHOUETTE TARGETS FOR MARKSMANSHIP TRAINING. RESEARCH MEMORANDUM. Oct. 1958, 5pp. Human Resources Research Office, George Washington University, Washington, D.C.

This note presents a discussion of the problems encountered as a result of the use of silhouette targets for marksmanship training and the manner in which the targets were modified for research purposes. The standard Army issue silhouette target is constructed of cardboard with the shape of a human target in a prone or kneeling figure. Problems of resistance to weather and durability under conditions of bullet strike were encountered. New targets constructed of fiberglass and one-quarter inch mesh galvanized cloth were compared for initial cost, durability, repair and repair time. T.

15,039

Baker, D.F. & Crawford, B.M. TASK PERFORMANCE WITH THE CRL MODEL 8 MASTER-SLAVE MANIPULATOR AS A FUNCTION OF COLOR-CODING, DISTANCE, AND PRACTICE. Proj. 7184, Task 71586, WADC TR 59 728, Nov. 1959, 16pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

To investigate the ability of Master-Slave Manipulator (CRL Model 8) operators to identify the slave hands and their movements with corresponding components and functions of the human body (forearm, wrist, and finger movement), a handling task involving rearrangement of blocks was devised. The task was performed under two conditions: 1) with standard slave jaws (red), and 2) with slave jaws modified so that the one corresponding to the thumb of the operator was green.

Work time as a function of task distance (9, 36, and 63 inches) was investigated and work ratios, based on mean time scores for direct versus remote handling, were determined. T. G. I. R 7

15,041

Crook, M.N. VISUAL FACTORS AFFECTING EFFICIENCY IN THE TASK OF PHOTOINTERPRETATION. ANNUAL SUMMARY REPORT. Contract NONR 494(17), Dec. 1959, 9pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

Work accomplished on a research study of visual factors affecting efficiency in photo-interpretation is summarized. Two phases are described: 1) a general survey of visual factors in photo-interpretation, and 2) a preliminary investigation of some specific factors. On the basis of survey results an outline of factors affecting visual performance in photo-interpretation is presented. The specific problems which have received attention are general illumination, illuminants for colored transparencies, differential illumination in stereo viewing, binocular viewing of duplicate photographs, and visual fatigue. R 12

15,042

Dennis, J.P. SOME SUGGESTED MEASUREMENTS FOR THE DESIGN OF THE DRIVER'S COMPARTMENT IN WHEELED VEHICLES. Tech. Memo 82, Jan. 1958, 7pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

This note presents data concerning seat design and positioning of controls in the driver's compartment of wheeled vehicles. Explanatory notes are reduced to a minimum. The recommended measurements and characteristics derived from the literature are given under the following headings: seat dimensions, seat cushioning, seat back, positioning of foot pedals, range of seat adjustment, hand controls, and clearance and accommodation. T. I. R 7

15,044

Forbes, T.W. SOME FACTORS AFFECTING DRIVER EFFICIENCY AT NIGHT. 1259 837, Dec. 1959, 16pp. Highway Traffic Safety Center, Michigan State University, East Lansing, Mich.

The results of selected research studies yielding background information on human reactions are combined to demonstrate certain relationships of importance in traffic design, operation, and safety as they affect night driving efficiency. The data presented are those on 1) perception, judgment, and response time in reduced visibility; 2) pupillary response times and visibility; 3) reduction and change of color sensitivity; 4) color constancy; and 5) visual factors and physical fatigue. G. R 9

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15, 054

15, 045

Forbes, T. W. HUMAN FACTORS IN HIGHWAY SAFETY. Oct. 1959, 17pp. Highway Traffic Safety Center, Michigan State University, East Lansing, Mich.

This paper on human factors in highway safety emphasizes that the driving public must be convinced of the importance of specific knowledge of best operating procedures and of maintaining most effective personal condition and driving behavior. Highway officials, designers, traffic engineers and safety experts should likewise be aware of such specific, scientific information. The perceptions, judgments, responses, knowledge, motivation, alertness and personality factors of the driver are analyzed as they relate to the task of driving. The Human Engineering approach to the study of safe driving is discussed and illustrated with specific examples. G. R 11

15, 046

Lewis, W. L. DESIGN FOR SAFETY A COLLECTION OF DESIGN NOTES AND HUMAN ENGINEERING BULLETINS SHOWING DESIGN FACTORS FOR IMPROVED SAFETY. 1957, 46pp. Daniel and Florence Guggenheim Aviation Safety Center at Cornell University, Ithaca, N. Y.

These design notes present a series of oversights in design which have led to accidents or potentially serious incidents in the operation of aircraft. Each note describes the situation, the danger, the fix, and states a design precept governing the case. The notes are not intended as design criteria, but only to pass on to engineers the lessons learned from difficulties in the past. Some Human Engineering Bulletins are included to illustrate the importance of using information already available to improve safety by engineering for human use. T. G. I. R 18

15, 047

Harris, J. D., Haines, H. L. & Myers, C. K. BRIEF TONE AUDIOMETRY - TEMPORAL INTEGRATION IN THE HYPACUSIC. Proj. NM 22 01 20 03 03, XVII(5), Rep. 298, June 1958, 15pp. USN Medical Research Lab., New London, Conn. (Reprinted from: A. M. A. Arch. Ophthal., June 1958, 67, 699-713).

To determine whether hearing for very brief duration tones can lead to a useful test for the diagnosis of hearing disorders, complete otoaudiological notes together with complete audiometry and tests of recruitment and of energy integration were obtained on a group of normal ears and patients with hearing impairment. In these latter cases, at least one normal or near-normal frequency was available to serve as a reference for loudness balancing and for integration data. A selected series of 25 defective ears was presented, using the slope of integration and

the T_0 (duration, in milliseconds) above which no further improvement in threshold occurs, which provides information as to the integrative power of the ear. Conclusions as to the usefulness of a temporal integration test are made. T. G. R 11

15, 048

Howell, W. C. & Kraft, C. L. SIZE, BLUR, AND CONTRAST AS VARIABLES AFFECTING THE LEGIBILITY OF ALPHA-NUMERIC SYMBOLS ON RADAR-TYPE DISPLAYS. Contract AF 33 (616) 3612, Proj. 7184, Task 71583, WADC TR 59 536, Sept. 1959, 38pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

To determine the functions relating size, blur, and contrast, and their interactions, to legibility of alpha-numeric symbols on a radar-type display, 12 subjects were studied under all 64 conditions obtained by combining factorially four levels of each of the three variables. The stimuli, 36 alpha-numeric symbols (26 letters of alphabet, Mackworth style, and ten Arabic numerals) were projected on a ground-glass screen one at a time at a rate controlled by the subject's verbal responses. Speed and accuracy were both stressed. Performance indices were information transmitted, speed, and accuracy. Confusion data were also reported. Optimum legibility is reported for the combined variables. Implications and possible generality of these data are discussed. T. G. I. R 17

15, 053

May, Pauline T., Arnold, R. D. & Denenberg, V. H. STATISTICAL STANDARD OPERATING PROCEDURE. STAFF MEMORANDUM. Aug. 1953, 7pp. Human Resources Research Office, George Washington University, Washington, D. C.

This note sets forth standard statistical operating procedures for 1) experimental design, 2) statistical analysis, and 3) general rules. Included are lists of symbols and formulas for use.

15, 054

Morrison, D. CREW COMPLEMENT EVALUATION. Proj. RP 1 F, Feb. 1949, 58pp. Flight Safety Foundation, Woods Hole, Mass.

This report proposes a study of the basic factors that must be considered in a systematic investigation of crew complement problems by scientific methods. The objectives of a continuing and expanding research program designed to provide objective and dependable evidence bearing on crew size are set forth; general and special problems of methodology and evaluation are pointed out; research methods now available and

15,055

likely to be useful to the investigation are described; and a plan is outlined for putting these methods to work in achieving the program objectives.

15,055

Chambers, R.M. & Smith, B.J. (Eds.). "WHAT NEEDS DOING ABOUT MAN-IN-SPACE?"—A DISCUSSION AT THE 1959 AMERICAN PSYCHOLOGICAL ASSOCIATION CONVENTION. 1959, 48pp. General Electric Company, Philadelphia, Penn.

This report contains eight short presentations on the topic "What Needs Doing About Man In Space?" given by psychologists who represented industry, government, and university activities. The major issues discussed were: 1) the role that man has in space, 2) criteria for determining whether a space vehicle should be manned or unmanned, 3) allocation of man-machine functions, 4) techniques and devices for simulating space flight conditions, 5) need for reliable data about man, machines, and space, 6) man's intellectual capabilities in space environments, 7) kinds of tasks to be used in studying man's capabilities, 8) selection of men for space flight, and 9) the need for new approaches to the problem.

15,056

Denenberg, V.H. ANALYSIS OF VARIANCE DESIGNS WITH DISPROPORTIONATE SUBCLASS NUMBERS. Aug. 1953, 4pp. Human Resources Research Office, George Washington University, Washington, D.C.

This note points out that when experimental designs have multiple classifications (more than one criterion of classification) the textbook formulas for analysis of variance do not hold unless the N's are equal or proportional in all subclasses. Snedecor's discussion of disproportionate subclass number is summarized and the techniques for analysis when the subclass frequencies are disproportionate offered by Walker and Lev and Lindquist are discussed. Suggestions are offered as to the types of design that appear best suited for field research. R 3

15,057

Guggenheim, H.F. (Chm.). SURVEY OF RESEARCH PROJECTS IN THE FIELD OF AVIATION SAFETY. 1959 ANNUAL SUPPLEMENT. 1959, 85pp. Daniel & Florence Guggenheim Aviation Safety Center at Cornell University, New York, N.Y.

This is the ninth in a series of annual surveys listing information on non-classified research conducted in various fields affecting aviation safety. Several hundred new projects are reported; the status of all active projects was checked on descriptive statements revised to accord with information obtained. A section containing completed projects is included. Areas in

aviation research safety where additional effort is required are outlined. R 900 (approx.) 15,058

Conover, D.W. THE AMOUNT OF INFORMATION IN THE ABSOLUTE JUDGMENT OF MUNSELL HUES. Contract AF 33(616) 3612, Proj. 7184, WADC TN 58 262, June 1959, 48pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

Using surface colors provided by the Munsell 50-hue series of colored papers, a preliminary equal-discriminability scale for the absolute recognition of colors was developed. Based on these data 16 colors were selected that represented an equally spaced series. This scale was validated with a second group of subjects. Both the initial and validating data were analyzed to determine the maximum amount of information in absolute judgments of hue which can be transmitted to the average color-normal observer by use of surface colors of maximum saturation. The implications for practical coding purposes are noted. T. G. L R 49

15,059

Alexander, H.S. & Chiles, W.D. AN EXPLORATORY STUDY OF PROLONGED INTERMITTENT PHOTIC STIMULATION. Proj. 7184, Task 71580, WADC TR 59 715, Nov. 1959, 6pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

To investigate the resistance of the human operator to effects of intense, flashing lights for prolonged periods of time, four subjects were exposed to very bright intermittent photic stimulation at five, ten, and fifteen cycles per second for a period of two and one-half hours. Bipolar electroencephalograms were recorded from the right and left occipital, parietal, and post-temporal areas of the brain. Continuous recording and monitoring were conducted for the first 30 minutes followed by three to five minute recordings every 20 minutes and, finally, 20 minutes of continuous recording at the end of the period. A simple addition test was given at 15-minute intervals. The data were analyzed for effects of photic stimulation over time. I. R 2

15,060

Ershoff, B.H., Wells, A.F., Bernick, S., Sobel, H., et al. CHRONIC EFFECTS OF LOW-LEVEL RADIATION UPON PROTEIN AND AMINO ACID REQUIREMENTS. Contract AF 33(616) 5873, Proj. 7165, Task 71838, WADC TR 59 609, Dec. 1959, 43pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Western Biological Laboratories, Culver City, Calif.).

Immature male rats were fed highly purified diets varying in protein content and

266

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15, 068

were continuously exposed for periods as long as 20 weeks to gamma radiation at levels from 0.3 to 300.0 roentgens per week. Control groups were fed the same diet but not irradiated. The effects of altering the protein content of the diet were analyzed. Substituting other types of protein or mixtures of amino acids were then studied. Oral administration of AET (S, 2-aminoethylisothiuronium ⁺BR⁻11Br⁻) in the diet or by forced feeding just prior to exposure was tested for the protective value afforded. Finally, the effects of diet and continuous low-level radiation on motivation and discrimination learning were investigated. T. I. R 37

15, 061

Dougherty, T. F. STUDIES OF THE MECHANISMS OF RESISTANCE TO STRESS. Contract DA 49 007 MD 130, Nov. 1959, 11pp. University of Utah College of Medicine, Salt Lake City, Utah.

Studies are reported on the role of Heparin as a biological ion-exchanger and as an anti-stress agent. Practical applications were made of Heparin as a treatment for acute asthma and some other allergic conditions dependent upon endogenous histamine release. Other studies are being conducted on the opposite roles of ACTH and thyroid hormones on the conjugation of steroid hormones and cholesterol. R 5

15, 063

Carroll, J. PRINCIPLES OF CRASH-INJURY INVESTIGATION. Rep. AV CIR 62 0 107, Sept. 1959, 37pp. Flight Safety Foundation, Phoenix, Ariz.

This presentation of the principles of crash-injury investigation was given at the sixth annual postgraduate course in aviation medicine. The thesis of the paper is that in survivable aircraft accidents, unnecessary injuries and death are produced primarily through aircraft design deficiencies and that primary corrective considerations lie strictly in the field of crash safety design engineering. In order to develop crash safety design parameters it is necessary to collect and analyze accident-injury data. Instructions are given as to the procedures to follow, the kind of data to collect, and how to conduct the investigation. Report forms, design data sheets, a list of basic equipment, and some bulletin board materials are included. G. I.

15, 065

Bilger, R. C. LABORATORY FACILITIES EMPLOYED IN PSYCHOPHYSICAL MEMORY EXPERIMENTS. Contract AF 49 (638) 369, Proj. 9778C, Task 37710, AFOSR TN 59 923, Tech. Memo. 72, Sept. 1959, 17pp. University of Michigan Research Institute, Ann Arbor, Mich.

Equipment and operating procedures used in psychophysical memory experiments at Electronic Defense Group are described and illustrated. This equipment gives precise control of signal parameters and enables one to collect efficiently the large quantities of data required for specification of the parameters of the human hearing mechanism. I.

15, 066

Lyons, J. D. SUPPLEMENT TO A BIBLIOGRAPHY OF HUMAN FACTORS IN RADAR OPERATION AND MAINTENANCE. STAFF MEMORANDUM. Aug. 1955, 12pp. Human Resources Research Office, George Washington University, Washington, D. C.

This supplemental bibliography of 115 items covers the period between 1 September 1953 and 1 March 1955 plus some articles published prior to 1 September 1953 which did not appear in the original bibliography. Categories used in the supplement are discussed in the original bibliography. R 115

15, 067

Ericksen, S. C. STUDIES IN ABSTRACTION LEARNING: III. THE TRANSFER OF PERCEPTUAL VERSUS ABSTRACTION LEARNING. Contract NONR 2149(01), Tech. Rep. 5, Aug. 1959, 52pp. Vanderbilt University, Nashville, Tenn.

This is another in a series of studies designed to investigate differences between abstraction learning processes and perceptual learning processes. It replicates the first study (see 15, 068) under better physical arrangements, with larger groups, and with additional conditions. The temporal walking maze was used under four different learning conditions, with thirty subjects for each condition. Results are discussed in terms of original learning performance as a function of conditions of learning. Performance was evaluated in terms of error scores. Three transfer tests were used to measure generality of learning, and a Transfer Index was developed. T. G. I. R 9

15, 068

Ericksen, S. C. STUDIES IN ABSTRACTION LEARNING: I. A COMPARISON OF PERCEPTUAL VERSUS ABSTRACTION LEARNING. Contract NONR 2149(01), Tech. Rep. 3, Aug. 1959, 18pp. Vanderbilt University, Nashville, Tenn.

To investigate the abstraction process as an intervening variable, two groups of subjects (25 blindfolded, 24 seeing) were compared as they learned to traverse a three-point temporal walking maze. Original learning and transfer tasks were used to encourage subjects to "abstract" relevant cues out of a stimulus situation and then use these cues to direct subsequent learning behavior.

15,069

After ten massed trials, three generalization tests were given to both groups. Performance was compared in terms of error scores and on the basis of verbal reports which explored characteristic methods of learning. T. G. R 7

15,069

Bousfield, W.A., Whitmarsh, G.A. & Esterson, J. SERIAL POSITION EFFECTS AND THE "MARBE EFFECT" IN THE FREE RECALL OF MEANINGFUL WORDS. J. gen. Psychol., 1958, 59, 255-262. (University of Connecticut, Storrs, Conn.).

To investigate serial position effects and the Marbe effect from the use of stimulus-lists of 5, 10, 20, and 40 words, 30 paid subjects were asked to recall words from one list of each of the four lengths. Relationship between the mean number of stimulus-words recalled and serial positions of these words in the lists was tested. The authors also analyzed results for relationship between frequency of recall of the words and earliness of occurrence of these words during recall. G. R 8

15,070

Bradley, J.V. TACTUAL CODING OF CYLINDRICAL KNOBS. Proj. 7184, Task 71581, WADC TR 59 182, Sept. 1959, 29pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

Tactual coding of knobs by use of bizarre shapes is frequently achieved at the expense of manipulability and setting precision, which appear, in many cases, to be optimal when knobs are cylindrical. Certain parameters of cylindrical knobs were therefore investigated: rim surface, diameter, and thickness. Each parameter was studied in a separate experiment with the other two held constant. In addition the effect of wearing gloves and time limitations were investigated. The subject's task was to feel one of two knobs whose pictures were before him and identify the correct picture. The data were analyzed in terms of the cues that would permit efficient tactual coding. T. I. R 18

15,071

Cook, S.F. & Leon, H.A. PHYSIOLOGICAL EFFECTS OF INERT GASES. Contract AF 29(600) 1313, Proj. 7851, Task 78516, AFMDC 59 26, June 1959, 35pp. USAF Aeromedical Field Lab., Holloman AFB, N.M. (University of California, Berkeley, Calif.).

This report presents the results of investigations on the use of helium and other inert gases in sealed cabin environments. Included in the report is an extensive bibliography (127 items) of previous work in the field. The report is prepared from progress reports and the

final report on one phase of a long-range program studying information essential for the successful operation of sealed cabins in space flight. The investigations summarized here include metabolic, tissue, and heat exchange studies. T. G. I. R 169

15,072

Burns, N.M. & Gifford, E.C. PRESURE SUIT MOBILITY: A PRELIMINARY STUDY. Proj. TED NAM AV 43003, Part 4 & Proj. NM 15 01 13 5, Part 1. Rep. NAMC ACEL 412, Oct. 1959, 15pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

Three pressure suit configurations (N-3, N-5, and N-7) were tested in a reaction time apparatus for the degree of mobility restriction they imposed on the subject when the suit was inflated to five pounds/square inch and when it was not inflated. Comparisons of reaction time and sustained sequential performance were made among the suit configurations and between the two pressure conditions. T. G. I. R 3

15,073

Brown, J.L. THE USE OF COLORED FILTER GOGGLES FOR PROTECTION AGAINST FLASH BLINDNESS. Proj. TED ADC AE 5210, Task MR005.13 6002.1, Rep. 89 & Rep. NADC MA 5917, Oct. 1959, 24pp. USN Aviation Medical Acceleration Lab., NADC, Johnsville, Penn.

To determine the effects of very bright flashes of light on the ability to perform visual acuity tasks, each of two observers identified the position of an acuity grating after presentation of a 0.9 second flash of a luminance of 12,500, 50,000 or 100,000 ft-L. The acuity target luminance varied from 0.75 to 4.24 log ft-L; acuity levels were 0.13 and 0.33; filters transmitting one per cent and ten per cent, as well as no filter condition were used. The observer was dark adapted 15 to 20 minutes prior to testing. Perception time was analyzed as a function of filter condition, luminance of adapting flash and target, acuity level. T. G. I. R 6

15,074

Lehiste, Ilse. AN ACOUSTIC-PHONETIC STUDY OF INTERNAL OPEN JUNCTURE. Contract NONR 1224(22) NR 049 122, Rep. 2, Aug. 1959, 116pp. Speech Research Lab., University of Michigan, Ann Arbor, Mich.

To investigate experimentally the phonetic manifestations of juncture, and to reconsider the phonemic interpretation of such features, three subjects, all speaking the Midwestern type of American English recorded a total set of 192 sentences, first with test word appearing in

268

random order, then arranged in contrasting pairs. Analysis was undertaken to determine the extent to which Morpheme boundaries are signalled by information present in sound waves. A technique to observe acoustical clues associated with juncture is described. Implications of the findings are discussed. T. I. R 166

15,075

Moser, H. M. & Durham, R. E. AN EXAMINATION OF THE SPOKEN VOCABULARY USED IN AIR TRAFFIC CONTROL. Contract AF 19(604) 4575, RF Proj. 882, AFRC TN 59 73, Tech. Rep. 55, Nov. 1959, 34pp. Ohio State University Research Foundation, Columbus, Ohio.

To obtain a frequency count of words used in air traffic communications as well as to determine the flexibility and limitations of this type of spoken vocabulary, a count was made of 3000 running words from Approach and Ground Control towers from each of three airports. These were analyzed for the total number of different words, for the Type-Token Ratio (TTR, a measure of vocabulary flexibility or variability), for six 500-word samples, and for five 100-word samples. Incremental TTR and the total TTR for the entire sample from each airport also were found. T. R 13

15,076

Mengelkoch, R. F., Adams, J. A. & Gainer, C. A. THE FORGETTING OF INSTRUMENT FLYING SKILLS AS A FUNCTION OF THE LEVEL OF INITIAL PROFICIENCY. Contract N61339126, NAVTRADEV-CEN 71 16 18, ca. 1958, 124pp. USN Training Device Center, Port Washington, N. Y.

To determine 1) how instrument flying skills are affected by a four-months interval of non-flying and 2) whether this effect differed as a function of initial level of flying proficiency, two matched groups of ROTC students were given a "high" and "intermediate" amount of flight training and then tested for retention after a four-month period of non-flying. Implications of the results for programs to maintain flight proficiency are discussed, and suggestions are made for needed further research. T. G. I. R 13

15,077

Meeker, W. F. ACTIVE EAR DEFENDER SYSTEMS: DEVELOPMENT OF A LABORATORY MODEL. Contract AF 33(616)3051, Proj. 7231, Task 71786, WADC TR 368(II), Dec. 1959, 41pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Radio Corporation of America, Camden, N. J.).

A laboratory model active ear defender using negative acoustic feedback to provide noise reduction was constructed. The noise

reduction obtained at each ear on one subject in a noise field of approximately 100 decibels was demonstrated. Improved transducer arrangements were then developed and further tests were made with arrangements for insert or semi-insert use as well as for conventional over-the-ear headset. The amount of noise reduction from 100 to 300 cycles per second was determined. Design requirements necessary to extend the range to higher frequencies are discussed. G. I. R9

15,078

McConnell, D. & Shelly, M. W. TRACKING PERFORMANCE ON A SEQUENCE OF STEP FUNCTIONS WHICH APPROACHES A CONTINUOUS FUNCTION AS A LIMIT. Contract AF 41(657) 70, Proj. 1710, WADC TR 59 43, July 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

To investigate the relations between continuous tracking error and error in tracking a sequence of step functions which approached the continuous signal as a limit, five paid male subjects each served six times in each of 36 conditions. Response measures were root-mean-square error between target and cursor and between cursor and limiting continuous function. Results were compared to previous findings concerning relations between stimulus amplitude and response amplitude. T. G. R 20

15,079

Pendergrass, E. P. EFFECTS OF X-RAY UPON THE SKIN OF HUMAN VOLUNTEERS. Contract DA 49 007 MD 191, Oct. 1959, 7pp. University of Pennsylvania, Philadelphia, Penn.

The purpose of this investigation, undertaken during World War II, was to determine the feasibility of using X-ray to depilate the donor site prior to skin grafting. There were 99 human volunteers in the original study. The thigh was the usual site of irradiation; dosage and fractionation were varied. It was determined at an early stage that permanent epilation was always accompanied by other undesirable radiation sequelae. However, follow-up of the volunteers has been maintained and observations on late radiation sequelae are reported herein.

15,080

Lowder, R. G. CONSIDERATIONS IN PREDICTION OF MAINTAINABILITY. Proj. 7184, Task 71586, WADC TN 59 378, Nov. 1959, 7pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

This brief report suggests a method for predicting how much maintenance will be required by a system before it goes into production. It also contains recommendations for construction of such a prediction instrument. R 6

15,081

15,081

Gain, P. & Fitts, P. M. A SIMPLIFIED ELECTRONIC TRACKING APPARATUS (SETA). Contract AF 41(657) 70, Proj. 1710, WADC TR 59 44, Nov. 1959, 12pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

A simplified electronic tracking apparatus which is economical and portable is described. By manipulating a control device the subject keeps a pointer of a zero-center meter at the null point. Voltages generated by the subject are compared with corresponding voltages generated by the meter. Result of the comparison is the sum of the voltages, or error. Error then introduced to the subject's display and to a second amplifier is integrated by a third amplifier and displayed on a voltmeter on the experimenter's console. G. I. R 4

15,082

Jolley, O. B. A SUMMARY OF PRIOR RESEARCH ON INTEGRATED CONTACT/INSTRUMENT FLIGHT TRAINING. STAFF MEMORANDUM. June 1958, 23pp. Human Resources Research Office, George Washington University, Washington, D. C.

This report is a summary of prior research in the area of training effectiveness of the integrated contact/instrument flight training concept. Implications of results of these studies for further research are discussed. R 8

15,084

Horth, T. C., Harpell, G., Pugh, A. L. III. & Grondstra, Jan. TECHNIQUES FOR AIR CONTROL SYSTEM APPLICATIONS. Proj. 8764, Task 46608, AFRCR TR 59 165, July 1959, 38pp. USAF Astorsurveillance Sciences Lab., AFRCR, Bedford, Mass.

This report consists of four Laboratory Memos which describe: 1) a passive coincidence circuit designed to aid the prediction of collisions when used with an iterative display computer; 2) an optical analog-to-digital converter; 3) a two-speed joy stick; and 4) an electronic switch built to switch direct-current analog tracking voltages to permit tracks to be labeled. These techniques had been found feasible, but they were not used in the production model of the Tactical Air Control System. I.

15,085

Harris, J. L. OPTIMUM FIXATION PERIOD FOR VISUAL SEARCH. Contract NOBS 72039, Proj. NS 714 100, Task 3, Rep. 3 4, March 1959, 30pp. S. Q. Duntley, La Jolla, Calif.

This study undertakes the prediction of visual search performance by calculational technique. The purpose of the report is "to illustrate sample calculations utilizing the most recent psychophysical-visual data and

extending the technique to allow determination of the optimum fixation period for a specified visual search task." G. R 6

15,086

Ray, W. S. ON THE INFLUENCE OF "CONGRUITY" ON THE SEARCH MECHANISM IN PROBLEM SOLVING. Contract NONR 2315 (00), Tech. Rep. 2, July 1959, 20pp. Cognitive Operations Laboratory, Bethany College, Bethany, W. Va.

Three experiments on problem solving are reported in which the process by which the problem solver searches for relations (congruities or similarities) between cognitions is investigated. Experimental materials included syllables to be paired in two-syllable words (Experiment I, 97 subjects; Experiment II, 81 subjects) and a combination of conditioning words and syllables (Experiment III, 24 subjects). Results are discussed in terms of the relationships which appear to hold between elements of a problem. R 13

15,087

Montague, W. E. & Kolstoe, R. H. ANALYSIS OF ACTIVITIES WITH IMPLICATIONS FOR TRAINING. Task NICORD May 1957, 64pp. Human Resources Research Office, George Washington University, Washington, D. C.

To obtain information concerning field activities of enlisted electronic maintenance personnel, data were gathered from 76 men in seven Ordnance NIKE detachments. A "reliable and comprehensive" description of the field situation and job activities is given. Maintenance activities were related to the school training the men had received. Training courses were evaluated by the men. T. G. I. R 1

15,088

Root, R. T. ANNOTATED BIBLIOGRAPHY OF RESEARCH STUDIES IN AVIATION MECHANICAL MAINTENANCE TRAINING. STAFF MEMORANDUM. March 1957, 21pp. Human Resources Research Office, George Washington University, Washington, D. C.

This annotated bibliography of 33 items is divided into three sections covering: 1) Mechanic Evaluation; 2) Task Analysis, Proficiency Measurement, and Criteria Measurement; and 3) Notices of Research Projects (Bio-Sciences Information Exchange). R 33

15,089

Root, R. T. AN ANNOTATED BIBLIOGRAPHY OF RESEARCH ON TRAINING AIDS AND TRAINING DEVICES. STAFF MEMORANDUM. Aug. 1957, 118pp. Human Resources Research Office, George Washington University, Washington, D. C.

4V 271

15,095

This bibliography was prepared as a comprehensive source of information in training aids and devices, especially in the armed service. Section I contains titles and abstracts of reports and articles on training devices; Section II includes reports and articles pertaining to the use and evaluation of training aids; Section III contains methodological articles concerned with methods for determining need for training aids and devices, ascertaining design requirements, and evaluation of aids and devices in use; Section IV contains items concerned with basic research relevant to training aids and device theory. R 349

15,090

Moser, H. M., Oyer, H. J., Fotheringham, W. C., O'Neill, J. J., et al. THE EFFECT OF AUDITORY STIMULATION ON THE PRONUNCIATION OF ENGLISH WORDS BY NON-NATIVE SPEAKERS. Contract AF 19(604) 4575, RF Proj. 882, AFCRC TN 59 56, Tech. Rep. 54, Sept. 1959, 16pp. Ohio State University Research Foundation, Columbus, Ohio.

To investigate the effects of auditory stimulation on the pronunciation of non-native speakers of English, eight foreign students recorded 50 stimulus words under two conditions: 1) pre-stimulation, in which the subject merely read words printed on a list, and 2) post-stimulation, in which the subject first listened to three pronunciations of a single test word by an American speaker and then attempted to imitate the pronunciation. Intelligibility scores were derived, and mean scores obtained under each of the two conditions were compared. T. R 12

15,091

Shapiro, R. & Consolazio, C. F. REPORT OF ENERGY REQUIREMENTS OF MEN EXPOSED TO SOLAR RADIATION AND HEAT. Proj. 6 60 11 020, Rep. 240, July 1959, 20pp. USA Medical Research and Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

To determine the effect of solar radiation and temperature on energy expenditure and caloric requirements, ten male subjects were exposed for ten days to humidity controlled periods of low (67 degrees F.), intermediate (73.3 degrees F.) and high (100.6 degrees F.) temperatures and to a period of direct sunlight (78.3 degrees F.). Sweat and pulse rates, internal body temperatures and blood pressures were recorded daily. Energy expenditure for controlled levels of activity and basic metabolism rates were measured with the Muller-Franz meter. Food and water were supplied freely and consumption recorded. Foods were analyzed for protein, fat, moisture and ash. Calories were computed using energy equivalents of

4, 9, and 4 for protein, fat, and carbohydrates. A discussion is included. T. R 23

15,093

Rolg, R. W. NON-LINEAR ADAPTATION IN MANUAL CONTROL SYSTEMS. Contract NOBS 72017, Rep. 7420 R 4 & Contract DA 19 020 ORD 4637, Rep. 7967 R 3, June 1959, 81pp. Massachusetts Institute of Technology, Cambridge, Mass.

To test the human operator as a feedback control element in a situation where a non-linear type of control characteristic appeared to have a good chance of performing better than an "optimum" linear system, three operators were trained and run using the Sanborn and the oscilloscope as visual displays. "Optimum" was defined as minimizing the mean square value of the difference between system input and system output. The specific objective was to determine if a human operator could adapt to a non-linear characteristic when it was to his advantage to do so. Previous work on human operator behavior is reviewed. T. G. I. R 11

15,094

Goffard, S. J. EFFECTIVENESS OF VARIATIONS IN CODE PRACTICE. Task RADOP II, May 1958, 25pp. Human Resources Research Office, George Washington University, Washington, D. C.

To relieve the monotony involved in practice required to develop skill in receiving International Morse Code, new practice materials, designed to be more interesting, were devised and evaluated experimentally against old materials. Two hundred sixty men, 138 experimental and 122 control subjects, were used in the research. Speed, progress, and follow-up tests were administered. R 9

15,095

Williams, H. L., Lubin, A. & Giesekeing, C. F. DIRECT MEASUREMENT OF COGNITIVE DEFICIT IN BRAIN-INJURED PATIENTS. J. consult. Psychol., 1959, 23(4), 300-305. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D. C.)

Comparing direct measures of premorbid intelligence with post-traumatic test results (Army Classification Battery), the authors sought to answer the following questions: 1) What is the amount of cognitive deficit produced by brain injury? 2) Does brain injury cause differential deficit in intellectual skills? 3) What is the best way of using the patient's premorbid and current level of intelligence to diagnose brain injury? Subjects were 64 patients, referred by neurological and neurosurgical services, and 64 controls. Differences between subtest scores were tested, using Box's test

for correlated means and Kendall's W test.
T. R 16

15,096

Simons, D.G. & Archibald, E.R.
SELECTION OF A SEALED CABIN
ATMOSPHERE. AFMDC TR 59 36, Sept.
1959, 16pp. USAF Missile Development
Center, Holloman AFB, N.M. (Reprinted
from: J. aviat. Med., May 1958, 29, 350-
357).

This report considers the selection of
oxygen supply, the problem of carbon di-
oxide and water vapor removal systems, and
the determination of the cabin atmosphere
pressure for a flight duration of 24 hours.
Tolerable limits were selected for no-
performance decrement rather than for com-
fort. G. I. R 16

15,097

Vitro Laboratories. STRATO-LAB
CABIN SYSTEM FUNCTIONAL REQUIRE-
MENTS. Contract NONR 2656(00), Tech.
Rep. 118, Oct. 1959, 66pp. Vitro Labora-
tories, Silver Spring, Md.

This report lists the functional re-
quirements imposed on the Strato-Lab in
tabular form. Requirements in the following
areas are included: 1) Flight Operations Re-
quirements, 2) Environmental Requirements,
and 3) Experimental Research Requirements.
There is a summary discussion of general
conclusions which have been drawn concern-
ing design aims and functional limitations
considered to be of prime importance.
T.G. I. R 4

15,099

Suppes, P. BEHAVIORISTIC FOUNDA-
TIONS OF UTILITY. Contract NONR 225(17),
Proj. NR 171 034, Tech. Rep. 23, July 1959,
29pp. Institute for Mathematical Studies in
Social Sciences, Stanford University, Stan-
ford, Calif.

The author uses the behavioristic no-
tions of stimulus, response and reinforce-
ment to derive a theory of subjective prob-
ability and utility. After discussing the
fundamental assumptions of stimulus sam-
pling learning theory, the author attempts to
show how this theory may be used to derive
a utility function for various simple choice
situations. Results of this discussion then
are related to Shannon's concept of entropy
and Luce's choice axiom. I. R 18

15,100

Draper, J., Edwards, R.G., Hardy,
R.H. & Hughes, W.P. METHOD OF ES-
TIMATING THE RESPIRATORY COST OF A
TASK BY USE OF MINUTE VOLUME DE-
TERMINATIONS SEPTEMBER 1952. Rep.
29, April 1954, 9pp. Clothing and Equip-
ment Physiological Research Establishment,
Ministry of Supply, London, England.

A method of assessing the metabolic
cost of a task by the variance-analysis of
determinations of minute-volumes of ex-
pired air is described. The method was
validated by a weight-carrying experiment and
was then applied in a comparison of respira-
tory response to different foot and back loads.
T. I. R 4

15,102

Finnie, A.W., Reid, A.M. & Lewis,
B.D. STREAMLINING THE SOLDIER IN
BATTLE ORDER A FORM OF LOAD CAR-
RIAGE. Rep. 60, Aug. 1956, 40pp. Cloth-
ing and Stores Experimental Establishment,
Ministry of Supply, London, England.

This report describes a form of load
carriage which seeks to distribute the pre-
sent battle order load equally between front
and back in such a way that comfort and
stability are increased. A small compara-
tive field trial was made of this equipment
and the Z2 (modified) equipment, which is
generally accepted as the best existing
British load carriage equipment for battle
order. The main field trial was supported
by range firing tests and a test on water up-
take and time of drying out of both equipments.
Subjective opinions were also obtained.
F. I. R 6

15,103

Hardy, R.H., Edwards, R.G. &
Hughes, W.P. SOME MOVEMENTS OF THE
FOOT DURING WALKING, FEBRUARY, 1953.
Rep. 28, Jan. 1954, 16pp. Clothing and
Equipment Physiological Research Establish-
ment, Ministry of Supply, London, England.

To examine the movements of the foot
during walking and to relate the movements
observed to probable muscular activity and
specific muscular function, foot movements
of 150 subjects, walking on a power-driven
endless belt, were recorded by means of
cinematography, electromyography and
photography of specifically placed neon
traces. Measurements were made with re-
ference to: inversion during the terminal
phase of the forward step; abduction of the
great toe during the same phase; inversion of
the feet during the thrust phase; eversion of
the foot during passing phase (free leg pass-
ing standing leg); and internal rotation of
the leg. Data are treated by means of the
Chi Square. A discussion is included.
T. G. I. R 16

15,104

Mardy, R.H. CRITERIA OF COM-
PARISON OF DIFFERENT TYPES OF FOOT-
WEAR (AUGUST-SEPTEMBER 1951). Rep.
16, April 1952, 21pp. Clothing and Equip-
ment Physiological Research Establishment,
Ministry of Supply, London, England.

To determine if simple laboratory ob-
servations before and after a forced march of

13 miles could detect any differences in response of a subject to the exercises in General Service Boots compared with Crepe-soled shoes, observations were made of 11 subjects by means of: slow motion cinematography, standard radiography, standard photography, plethysmometry, dynamometry, and subjective responses. Data are treated statistically by comparing before and after observations of subjects using both kinds of footgear. Results are discussed in terms of the establishment of criteria for footwear comparison. T. I. R 14

15, 105

Kenchington, K. W. L. & Draper, J. TRIALS AT LOW TEMPERATURES OF GLOVES-COLD/WET (MARCH-APRIL, 1955). Rep. 55, Feb. 1957, 28pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

To compare the performance of three different combinations of handwear for use under cold/wet conditions, the following tasks were carried out by 19-1/2 year old subjects in a climatic chamber at 32 degrees F and 10 degrees F: marching, resting, handling wet ice, loading and firing a rifle, and dismantling and reassembling a Bren gun. Objective measurements were made of hand temperatures and of manipulative dexterity. Subjective assessments of hand comfort and suitability were also obtained. Recommendations are made concerning relationships between thermal environment, condition of gloves, dexterity and required activities. T. G. I. R 6

15, 106

Kenchington, K. W. L. & Draper, J. PETROLEUM RESISTANT MITTENS PART II. A SURVEY OF HAND DIMENSIONS. CEPRE Rep. 21, Nov. 1952, 17pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

To determine the range and distribution of hand sizes of potential users of petroleum resistant mittens, a simple sizing board was used to obtain hand length and breadth dimensions from a random sample of 100 servicemen. Theoretical distributions are fitted to the data and used in preparing different hand sizing schemes based upon two breadths and three, four, and five different lengths. Proportions of mittens to be manufactured for each hand size are calculated for each of these schemes and the percentages of the population expected to be fitted by the scheme are determined. Recommendations for the future design of petroleum resistant handgear are included. T. G. I.

15, 107

Provins, K. A. COMMENTS ON THE LAY-OUT OF THE DRIVER'S CABIN F. V.

1000. Memo. 2, Jan. 1951, 4pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

A drawing of a conventional motor vehicle cab is reviewed. The following features of the layout are discussed and recommendations made: general layout, steering, foot pedals, hand brake, gear lever, seat (angle and firmness), and seat adjustment. T. I. R 8

15, 108

Provins, K. A. & Stockbridge, H. C. W. COMMENTS ON THE SEATING ARRANGEMENTS F. V. 402. Memo. 3, April 1951, 6pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

Drawings of general arrangements and seating in the Morris Motors F. H. 393, A. 1570 and A. 1571 Tanks were inspected and commented upon. Comments were focused on, and included, the following aspects of seating: aspects of design such as dimensions, covering, surface inclination, relation of seat to controls, and leg-seat height. I. R 4

15, 109

Provins, K. A. & Stockbridge, H. C. W. COMMENTS ON THE COMMANDER'S SEAT. F. V. 603. Tech. Memo. 6, Dec. 1952, 5pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

An armrest support was designed and built which, while using minimum space, would retain the desirable features of an earlier buttock support: provision of adequate body stabilization while enabling the operator (Commander/Gunner) to rotate his body and a machine gun easily in one movement. Ten subjects supported themselves in a mock-up for 10 minutes in a position approximating that in the turret of the F. V. 603. Subjective opinions of the comfort of the backrest support were obtained. The armrest support was discussed in terms of suggested modifications and use on vehicles other than the F. V. 603. I.

15, 110

Reid, A. M., Renbourn, E. T. & Draper, J. A COMPARATIVE PHYSIOLOGICAL FIELD TRIAL OF FOUR TYPES OF LOAD CARRIAGE EQUIPMENT. Rep. 43, Jan. 1955, 22pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

The trial represents an attempt to assess the physiological strains imposed by four types of load carrying equipment. The assessment consisted of 1) a validation field trial in which the value of the measurements was examined, 2) a main field trial in which the four equipments were compared in battle order, and 3) a laboratory trial comparing the equipments. The measurements were 1)

physiological—pulse rate, rectal temperature, respiratory ventilation volume, and subjective rating; 2) performance tests—rifle fire, Bren magazine filling and sand shoveling. Marches of three and six hours and periods of 28 hours continuous duty in the field and half hour walks at three miles per hour (treadmill) in the laboratory were carried out. T. I. R 7

15,111

Renbourn, E.T. & Taylor, P.F. BODY TEMPERATURE STUDIES PART II. RECTAL AND ORAL AS INDICES OF INTERNAL TEMPERATURES. SOME THEORETICAL AND PRACTICAL CONSIDERATIONS. Rep. 53, April 1956, 48pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

The interrelationship is considered of temperatures in men taken simultaneously in the mouth and at three points in the rectum under the following conditions: 1) rest, 2) postural change, 3) exercise, 4) heating and cooling, 5) eating and drinking. The results are of some fundamental interest but may also throw light on practical problems concerning the physiology of clothing and equipment. Data from various animals are included. T. G. I. R 60

15,112

Siddall, G.J., Anderson, D.M. & Draper, J. FATIGUE DURING PROLONGED PERFORMANCE ON A SIMPLE COMPENSATING TRACKING TASK JANUARY - MARCH 1954. Rep. 45, Jan. 1955, 14pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

To test the hypothesis that absence of variability of sensory input relates to fatigue of tracking performance, a preliminary experiment was conducted with 21 subjects. Each subject was tested for an uninterrupted period of two hours on a simple compensatory tracking task that required keeping the target correctly aligned by cranking a handwheel at a constant speed. It was considered that failure to attend the display would result in target deviation. The resulting errors were recorded and analyzed for consecutive half-hour periods. T. G. I. R 11

15,113

Stokes, A.W., Hughes, W.P. & Draper, J. PRELIMINARY TRIAL OF HEAVY LOAD CARRIAGE. CARRIER, MANPACK, G.S. & U.S. PACKBOARD, PLYWOOD. Rep. 48, July 1954, 24pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply London, England.

This study compares the Carrier, Man-Pack, G.S., Type 'P' and U.S. Packboard, Plywood and investigates the ventilation volume and pulse rate when loads

greater and less than one-third body weight are carried. Four men carried loads of 40 and 75 lb. on 90-minute marches in summer weather on the above carriers; physiological measures were taken at different intervals throughout. Subjective opinions were also obtained. The physiological data were subjected to variance analysis. T. I. R 11

15,114

Tolson, J. & Draper, J. BODY TEMPERATURE STUDIES PART I. SKIN TEMPERATURE SYMMETRY AND MEAN. Rep. 52, July 1956, 19pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

To obtain information on skin temperatures at symmetrically placed points on the body and to compare various methods of estimating mean skin temperature, three experiments were performed. 1) Temperature variation over small areas of skin was measured on one subject. Temperatures at points on the circumference and at the center of one-inch diameter circles on various parts of the body were determined. 2) Skin temperatures were measured at a large number of symmetrically placed points on the skin of one subject. 3) Experiment two was repeated on four subjects. Six different methods were used to calculate mean skin temperatures. T. G. I. R 19

15,115

Reid, A.M., Draper, J., Finnie, A.W., Anderson, D.M., et al. A COMPARATIVE PHYSIOLOGICAL TRIAL OF A PROTOTYPE COMBAT EQUIPMENT FIGHTING ORDER, (C.E.F.O.) AND THE EXPERIMENTAL EQUIPMENT Z.2 (M.P.). Rep. 84, Sept. 1957, 44pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

The trial was carried out in two phases: 1) a conditioning period during which the 16 subjects were hardened up and standardized as far as possible by repeated practice in taking all obstacles used; 2) the test period in which equipments were compared during normal soldierly activities such as marching, running, jumping, etc.; in performance of such tests as digging; and finally, in a long exercise of 26 hours continuous duty. Measurements were taken of post exercise pulse rates, time measures where appropriate, subjective opinions, and observational notes with photographs. Comparisons were made on the basis of all these measures. T. G. I. R 5

15,116

Brown, G.H., Zaynor, W.C., Bernstein, A.J. & Shoemaker, H.A. DEVELOPMENT AND EVALUATION OF AN IMPROVED FIELD RADIO REPAIR COURSE. HUMRRO TR 58, Sept. 1959, 81pp. Human Resources Research Office, George Washington University, Washington, D.C.

Information obtained in a field study was the basis for revising a course of instruction for Field Radio Repairmen, MOS 296.1. The new course emphasizes recognizing and correcting the most common troubles in the most frequently repaired items of equipment. A systematic trouble-shooting procedure was provided and "functional contest training" features (theoretical material presented in a maintenance-oriented contest) were incorporated. To evaluate the new course two groups of 100 students each were given the new course and the standard course respectively and were then administered a comprehensive battery of job-related proficiency tests. Performance scores were compared for relative proficiencies. T. G.

15, 117

Washington University, St. Louis, Mo. PHYSIOLOGICAL STRESS AND FOOD CONSUMPTION. Contract NR DA 19 129 QM 802, Proj. 7 84 15 007, Rep. NR 9(Progress), July 1959, 12pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.

To determine the effects of a liver supplemented diet on resistance to physiological stress, 63 rats, in a series of psychological experiments, were fed diets of rat liver and compared with 62 control rats in terms of weight gain, effects of cold stress on reducing weight gain, survival time in cold water, emotionality and maze performance. Results were analyzed by means of t test and compared with results obtained by other investigators. T. G. R 5

15, 118

Salmires, S. & Tapscott, R. J. THE EFFECTS OF VARIOUS COMBINATIONS OF DAMPING AND CONTROL POWER ON HELICOPTER HANDLING QUALITIES DURING BOTH INSTRUMENT AND VISUAL FLIGHT. NASA TN D 58, Oct. 1959, 38pp. National Aeronautics and Space Administration, Washington, D. C. (Langley Research Center, Langley Field, Va.).

To determine the effects of control power and damping variations on handling qualities, four experienced pilots made 35 visual flight maneuvers and Instrument Landing System approaches conducted under simulated blind-flying conditions in a 5,500 pound, reciprocal-engine helicopter. Control power (moment on helicopter produced for a given control displacement) ranged from one-half original to four times the original power. Damping (moment on helicopter proportional to and opposing angular velocity) ranged from very low to high. Results are evaluated on the basis of pilot opinion and appropriate statistical procedures (t tests) and discussed in terms of applicability to the other aircraft. T. G. I. R 8

15, 119

Whitmore, W. F. (Proj. Officer). OPERATIONS RESEARCH AS A MEANS OF COMMUNICATION WITH MANAGEMENT. Ca. 1958, 15pp. USN Bureau of Ordnance, Washington, D. C.

This paper discusses the need for management oriented operations research as a means of communication between technical staffs and management. Five documented examples of inadequate communication between technical staff and management are presented. Also two examples of adequate communication are given. Recommendations for the nature of communication from technical staffs to management are discussed in the light of the percentage of communication taking place in industry. R 3

15, 120

Gaskill, H. S. SURVEY OF PERSONAL AND INTERPERSONAL FACTORS IN DRIVING. FINAL REPORT. Contract DA 49 007 MD 502, Nov. 1959, 21pp. University of Colorado Medical Center, Fort Collins, Colo.

To determine if specific personality factors associated with accident/violation driving could be used to identify non-safe drivers before they began to drive, a predictive study of 6906 "pre-drivers" (median age 15 years) were administered a battery of personality tests (Guilford-Zimmerman Temperament Survey; Allport, Vernon and Lindzey Study of Values; Driver Survey; and the OTAT). Also, three specific tests on a group of 52 driver education subjects and 104 non-driver education control subjects were gathered and analyzed in terms of 26 pressures of personality and value for each subject. T. G. R 7

15, 121

Knapp, R. R. A BREATH-HOLDING TEST: A PRELIMINARY INVESTIGATION OF ITS PSYCHOMETRIC USEFULNESS. Proj. NM 18 01 09 1 2, Vol. IX, Oct. 1959, 345-368. USN Medical Field Research Lab., Camp LeJeune, N. C.

To explore the usefulness of a group objective test of breath-holding in contributing to the assessment of temperamental characteristics, a method was presented for administering such a test. The test was administered to a group of 51 Marine Corps officer helicopter pilots on two occasions. Test-retest reliability was computed. Test scores were then related to personality measures obtained from the Guilford-Zimmerman Temperament Surveys, the Minnesota Multiphasic Inventory and the Objective-Analytic Personality Test Battery. Significant relationships are interpreted and recommendations for further study are made. T. R 13

15, 122

15, 122

Kircher, J.F., McNulty, J.S., McFarling, J.L. & Levy, A. THE EFFECTS OF RADIATION ON OXYGEN DESIGNED FOR HUMAN CONSUMPTION. Contract AF 33(616) 5659, Proj. 7165, Task 71838, WADC TR 59 618, Dec. 1959, 33pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio, (Battelle Memorial Institute, Columbus, Ohio).

This paper reports research which was conducted to determine the "nature, amounts, rates and modes of formation, and stabilities of potentially hazardous products formed by gamma irradiation and by mixed-field irradiation of aviators' breathing oxygen." The study was specifically concerned with understanding the effect of nitrogen-oxide produced during irradiation. Possible mechanisms which could explain effects of trace impurities in the oxygen on the radiation-induced formation of ozone were discussed. T. G. R 24

15, 123

Arens, E. & Stuart, W.A. ANALYSIS OF DESIGN U.S. ARMY PROTECTIVE HEADGEAR. Contract DA44 109 QM 1821, March 1956, 49pp. Egmont Arens, Industrial Design, New York, N. Y.

A device constructed of light-weight armor materials to protect the head against fragmentation type missiles was designed, developed, and evaluated. First, the basic requirements for such an equipment are set forth, e.g., bump, environmental, ballistic protection, and the three variables in headgear make-up-weight and material, size, suspension are presented. Eight types of helmet are pictured and described with their basic advantages and disadvantages. I.

15, 124

Senders, J.W. SURVEY OF HUMAN DYNAMICS DATA AND A SAMPLE APPLICATION. Contract AF33(616) 5607, Proj. 7180, Task 71501, WADC TR 59 712, Nov. 1959, 12pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.).

This study concerns the application of the results of research on the human transfer function to compensatory tracking tasks in which the human operator is part of a closed loop tracking system. The form of a quasilinear (linear for a particular task) human transfer function was laid out on the basis of previous experimental results. Calculations were made of mean square tracking error, and effects of variation of aircraft dynamics on tracking error were examined, assuming human reaction time and neuromuscular lag were constant. I. R 11

15, 125

Regan, J.J. TRACKING PERFORMANCE RELATED TO DISPLAY CONTROL CONFIGURATIONS. Proj. 20 F 10B, NAVTRADEVEN TR 322 I 2, Jan. 1959, 32pp. USN Training Device Center, Port Washington, N. Y.

To determine the relative merit in terms of operator performance, six display-control configurations using a continuous random input, position and rate control, and pursuit and compensatory tracking were tested. Ninety-six male college students served as subjects. Questions such as the following were investigated: Does the operator perform better with linear or rotary display configuration? Are differences in eye-hand coordination performance with various display-control situations magnified or diminished with practice? Implications of the results are discussed for the form in which information is presented to, and in which control is exercised by, operators in instructor's stations and other training equipment. T. I. R 35

15, 126

Molnar, A.R. & Lybrand, W.A. BASIC DEVELOPMENT ACCOMPLISHED ON WIDE-ANGLE, NON-PROGRAMMED, VISUAL PRESENTATIONS. VOLUME II. Contract N61339 404, NAVTRADEVEN TR 404, April 1959, 195pp. USN Training Device Center, Port Washington, N. Y. (Carmody Corporation, Buffalo, N. Y.).

Part I of this report contains a discussion and evaluation of equipment and techniques used in visual presentations and a summary of functional design criteria which should be considered in the design of visual equipment for training purposes. There are also recommendations for research and development. Part II contains abstracts of documents pertaining to visual presentations and includes the areas of design approach, training purpose and characteristics, description of useful components, and a brief summary of reports reviewed. Part III consists of a 75-item general bibliography. Part IV presents the state-of-the-art questionnaire sent to manufacturers and organizations. R 147

15, 127

Molnar, A.R. & Lybrand, W.A. BASIC DEVELOPMENT ACCOMPLISHED ON WIDE-ANGLE, NON-PROGRAMMED, VISUAL PRESENTATIONS. VOLUME I. Contract N61339 404, NAVTRADEVEN TR 404, April 1959, 142pp. USN Training Device Center, Port Washington, N. Y. (Carmody Corporation, Buffalo, N. Y.).

This report is a survey of research and basic development on wide-angle, non-programmed, visual presentation. It summarizes available information in a form intended to be useful to design engineers

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working this area. The visual presentations discussed are used primarily as training and research tools for the purpose of simulating the "real visual world" to operators of vehicle systems. T. I. R 31

15, 128

Howell, W. C., Christy, R. T. & Kin-kade, R. C. SYSTEM PERFORMANCE FOLLOWING RADAR FAILURE IN A SIMULATED AIR TRAFFIC CONTROL SITUATION. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 59 573, Sept. 1959, 15pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Laboratory of Aviation Psychology, Ohio State University & The Ohio State University Research Foundation, Columbus, Ohio).

The situation in which the operator assumes control in the system after failure of a primary automatic component was studied using the Ohio State University Electronic Air Traffic Control Simulator. Primary variables were: prebreakdown activity of operator and degree of procedural flexibility in the task. Six trained undergraduates participated both as operators and pilots. A factorial design was employed. Performance was measured in two categories: system efficiency and safety. The results are handled in terms of manual takeover of an aircraft after loss of Planned Position Indicator information in an air traffic control system. F. I. R 7

15, 129

Murphy, G. L. & Newman, P. H. HUMAN FACTORS HANDBOOK FOR DESIGN OF TESTING AND MONITORING GROUND SUPPORT EQUIPMENT. VOLUME II. Contract AF 29(601) 513, Proj. 7800, AIR 257 59 FR 196, AFSWC TR 59 12, April 1959, 77pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

This handbook is one of a series designed to guide military and industrial designers who translate ideas into drawings and equipment. This volume was prepared for designers of testing and monitoring equipment used to support airborne weapons. Types of equipment discussed include: hand-held, portable, and console type testers, controls, displays, panel layout. General considerations in the design of test equipment are discussed also. I. R. 33 (approx.)

15, 130

Murray, E. J., Schein, E. H., Erikson, K. T., Hill, W. F., et al. THE EFFECTS OF SLEEP DEPRIVATION ON SOCIAL BEHAVIOR. J. soc. Psychol., 1959, 42, 229-236. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D. C.).

To determine the effect of sleep deprivation on a variety of social activities and

on the frequency of change from one activity to another, two experiments were performed in which behavior observations were made for 72 and 98 hours of sleep deprivation. In the first, 10 subjects were observed extensively (every 15 minutes); whereas the second was done to obtain a larger sample of subjects (50) using fewer observations (at beginning, then after 86 to 88 hours) after a longer loss. The percentage of various categories of behavior were statistically compared for the experimental and control groups as well as within the experimental as a function of hours of loss.

T. G. R 8

15, 131

Murphy, G. L. & Newman, P. H. HUMAN FACTORS HANDBOOK FOR DESIGN OF TRANSPORTING, POSITIONING AND LIFTING GROUND SUPPORT EQUIPMENT. VOLUME I. Contract AF 29(601) 513, Proj. 7800, AIR 257 59 FR 195, AFSWC TR 59 11, April 1959, 100pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

This handbook is one of a series designed to guide military and industrial designers who translate ideas into drawings and equipment. This volume was prepared for designers of transporting, positioning, and lighting equipment used to support airborne weapons. Types of equipment discussed in this handbook include vehicles and major vehicle components, and auxiliary and emergency equipment. General considerations in the design of positioning, lighting, and transporting equipment are discussed. Chapter IV considers problems of work spaces. T. G. I. R 48

15, 132

Plomp, R. & Bouman, M. RELATION BETWEEN HEARING THRESHOLD AND DURATION FOR TONE PULSES. J. acoust. Soc. Amer., June 1959, 31(6), 749-758. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

The relation between hearing threshold and duration for tone pulses was examined in light of a new hypothesis: "Switching on a tone pulse of intensity I results in an effect somewhere in the hearing pathway, that approaches its end value asymptotically according to an exponential function, this end value being proportional to I; perception occurs when s exceeds a critical value so." Masked thresholds at a fixed noise level were obtained on two observers at 250, 500, 1000, 2000, 4000, 8000 cps. for durations of ten seconds to one msec., by a descending series of intensities. A formula was derived to correct for short pulse durations because these data deviated from the hypothesis. The data from other relevant studies are also discussed in terms of the present hypothesis. T. G. I. R 13

15, 133

15, 133

Levine, R.A. & Rainey, R.B. THE BASE MAINTENANCE-OPERATIONS MODEL USED IN RAND LOGISTICS RESEARCH. Proj. RAND, RM 2374, May 1959, 43pp. RAND Corporation, Santa Monica, Calif.

This research memorandum presents a non-mathematical explanation of a model used in studying "the interaction of aircraft operations and base-level logistics, particularly direct maintenance". The purpose of the paper is to "help the reader gain a full understanding of past and future publications on RAND research in this area". The model measures the effects of Air Force maintenance and operations policies, simulating the random nature of real-world maintenance and operations events. I. R 5

15, 134

Holt, R.R. & Goldberger, L. PERSONOLOGICAL CORRELATES OF REACTIONS TO PERCEPTUAL ISOLATION. Contract AF 33(616) 6103, Proj. 7222, Task 71745, WADC TR 59 735, Nov. 1959, 46pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Research Center for Mental Health, New York University, New York, N.Y.).

To determine the relationship between personality and reactions to sensory deprivation, 14 male students were subjected to eight hours of such deprivation, then retested on a battery of cognitive tests as well as several personality assessors. Fourteen measures of reaction were derived from the behavior and verbalizations in the deprivation situation. From personality data Q-sort ratings were obtained. The results are presented as rank-order correlation coefficients between the dependent variables from the isolation study and independent variables of personality. T. R 36

15, 135

Holding, D.H. AN APPROACH TO THE PROBLEM OF EQUIPMENT COMPLEXITY AND MAINTENANCE TIME USING ARMY SELECTION GROUP DATA. Tech. Memo. 18, ca. 1954, 6pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

The problem of equipment complexity and its relation to maintenance time was examined in terms of criteria of efficiency and potential manpower using army selection group data. The criteria of efficiency are operating time, operating complexity, and existing operator/maintainer ratio. The potential manpower problem involves army selection procedures, aptitude tests, and educational standards. No specific recommendations are made. T. G. R 3

15, 136

Holding, D.H. DISPLAY-CONTROL RELATIONSHIPS. Tech. Memo. 31, Jan. 1955, 11pp. Clothing & Equipment Physiological Research Establishment, Ministry of Supply, London, England.

Experimental work on display-control relationships is reviewed and summarized in terms of single and multiple display-control combinations. The aspects of display-control combinations considered include direction of motion, time relations, movement ratios, and arrangement of multiple display-control units. Suggestions are made concerning each of the above aspects taken separately, but recommendations are all of a general nature. The appendix includes control-display illustrations. I. R 43

15, 137

Kossack, C.F. & Beckwith, R.E. THE MATHEMATICS OF PERSONNEL UTILIZATION MODELS. Contract AF 41 (657) 160, Proj. 7719, Task 17112, WADC TR 59 359, Nov. 1959, 36pp. USAF Personnel Lab., Lackland AFB, Tex. (Purdue University, Lafayette, Ind.).

A personnel utilization model was developed for the study of policy problems in a complex personnel organizational structure. Included are definitions of concepts and terms, flow diagrams, and an illustration of the model applied to Airman training and assignment. A specialization of the model using the mathematics of Markovian processes is also presented. The advantages of developing and using such a technique are indicated. I. R 15

15, 138

Harris, J.D. AUDITORY FATIGUE FOLLOWING HIGH FREQUENCY PULSE TRAINS. Proj. NM 22 03 20, 02, 01, XVIII(I), Rep. 306, Jan. 1959, 9pp. USN Medical Research Lab., Naval Submarine Base, Conn.

Auditory fatigue following trains of high tone pulses was measured in 156 young men varying: 1) sound pressure level (SPL)--90 to 120 db., 2) duration of exposure--1 to 25 minutes, 3) duty cycle--1.4 to 100 percent. Stimulation was at 3500 cps. Index of fatigue was the total cumulated loss of threshold occurring in the first ten minutes of recovery. Equi-noxious contours were obtained with the NOX, a new unit derived from the fatigue index employed. From these data protection levels and damage risk criteria were specified. T. G. R 13

15, 139

Halsey, Rita M. IDENTIFICATION OF SIGNAL LIGHTS: I. BLUE, GREEN, WHITE, AND PURPLE. II. ELIMINATION OF THE PURPLE CATEGORY. Proj. NM

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22 02 20.03.01, XVIII(5), Rep. 310, May 1959, 14pp. USN Medical Research Lab., Naval Submarine Base, Conn. (Reprinted from: J. opt. Soc. Amer., Jan. 1959, 49(1), 45-55).

Identification of colored light signals by 100 observers using one of six color names (red, yellow, green, blue, purple, white) was done for two intensity levels of each of 50 stimuli presented singly against a dark background. The test colors were blue, green, white, and purple. Ten observers in four rows were run at a time, thus there were four viewing distances (10 to 17.5 ft.) and four sizes of stimulus (4 ft, 10 ins. to 4 ft. 6 ins.); they recorded their observations on data sheets. The results were represented as chromaticity zones. A second experiment repeated the above one except "purple" was eliminated as a possible response. The data from these two studies are applicable to colored signal specifications. T. G. I. R 14

15, 141

Gravendeel, D.W. & Plomp, R. THE RELATION BETWEEN PERMANENT AND TEMPORARY NOISE DIPS. AMA Arch, Otolaryn., June 1959, 69, 714-719. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

Permanent and temporary noise dips were measured on 288 soldiers and 36 recruits respectively by continuous audiometry. The relation between these two forms of noise deafness was sought to determine whether the same mechanism is responsible for these losses. Spread of dips across the frequency spectrum and average shape of dips were determined from the audiometric data. Comparison of these characteristics in the two cases provided some evidence about the nature of the mechanism. T. G. R 7

15, 142

Lear, Incorporated, Santa Monica, Calif. WHOLE PANEL STUDY AND DEVELOPMENT SUMMARY REPORT 1957-1958. Contract AF 33(616) 5167, Proj. 6190, Task 61940, WADC TR 58 447 & Lear Engng. Rep. 1289 I, March 1959, 290pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

The primary objective of this study was "advancement of the state of the art of instrument panel and cockpit design." Cockpits were designed for specific classes of vehicles, and instrumentation and layouts of these cockpits are described. Individual items studied and selected for further study by the Air Force and airframe manufacturers are enumerated. The philosophy of cockpit arrangement is discussed and a new philosophy, "Pilot-Manager System" was developed. Pilot reaction to design was obtained through

the use of questionnaires. T. G. I. R 21 approx.

15, 143

Darby, C.L. AN ANNOTATED BIBLIOGRAPHY ON THE AUTOMATION OF INSTRUCTION RESEARCH MEMORANDUM. Task TEXTRUCT, July 1959, 36pp. USA Air Defense Human Research Unit, Fort Bliss, Tex.

This bibliography contains 95 references to articles concerning 1) Individual Teaching Devices; Self-Scoring Tests; Subject Matter Trainer; Skinner Teaching Machines; and Crowder "Intrinsic" Programming, 2) Group Instructional Devices; Films and the Classroom Communicator, 3) Theoretical Issues and Relevant Experiments, and 4) Learning Theories; Some General References and Applications. R 95

15, 144

Dennis, J. THE SERPENT TEST - A STUDY OF FATIGUE. Tech. Memo. 19, April 1954, 7 pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

A dynamic equilibrium test, the Serpent Test, was used to measure the effect of a stressful environment. Ten groups of six subjects each went through periods of work and rest randomly ordered. Work was a step task with step rate 90 per minute, temperature 91 degrees, and duration 30 minutes. After work or rest each subject performed the Serpent Test, threading a brass ring around a coil with minimum contact between the two. Number of contacts and time to perform test were the main measures compared by analysis of variance. I. R 14

15, 145

Corkindale, K.G. & Siddall, G.J. A SHORT EVALUATION OF NUPRONITE SAFETY NIGHT DRIVING GOGGLES. Tech. Memo. 35, June 1955, 9pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

To evaluate the general design of Nupronite safety night-driving goggles and to determine their anti-glare properties, five subjects, under glaring conditions, each made 20 judgments wearing glasses (and 20 judgments while not wearing glasses) of the position of a Landolt broken ring. Results were discussed in terms of acuity vs. anti-glare properties (determined by subjective opinion). Also, a questionnaire was administered to five subjects wearing goggles. The items concerned: reduction of traffic headlight glare, reduction in visual field, misting and windproofing, comfort and adjustment, durability, and reflection from silvered portions of the lenses. Results

from both the acuity test and the questionnaire are utilized in presenting the satisfactory as well as unsatisfactory anti-glare and acuity properties. I. R 4

15, 146

Enoch, J.M. & Fry, G.A. VISUAL SEARCH OF A COMPLEX DISPLAY: A SUMMARY REPORT. A SUBTASK WHICH IS PART OF THE PROGRAM ON HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION. Contract AF 30(602) 1580, Proj. 696, & Proj. 1763. Task 39885, MCRL Tech. Paper (696) 17 282, RADC TR 59 65, April 1958, 12pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

The findings from a series of experiments designed to delineate the natural modes of approach by the photo-interpreter during a visual search task were briefly reviewed. The major phases of the problem thus considered included: degree of specificity of instructions, display content, size and physical quality, time allowed for search, and training-experience of observer. Applications of these results and suggestions for future research are also considered. R 12

15, 148

Brady, J.V. COMPARATIVE APPROACH TO THE STUDY OF DRUG EFFECTS ON THE BEHAVIOR OF HIGHER ANIMALS. Reprinted from: "Evolution of Nervous Control," 1959, 115-133. American Association for the Advancement of Science, Washington, D.C.

Operant conditioning techniques were used to produce and measure emotional behavior patterns in experimental animals and to investigate the effects of various drugs upon these affective responses. Rats and monkeys, under food and water deprivation, were trained in the bar pressing situation on a variable interval reinforcement schedule. An anxiety stimulus, brief electric shock, was conditioned to a click. Reserpine was then administered daily after each session for a given number of trials; then a series of trials without the drug; then another reserpine series. Response rates were compared for these periods; behavior changes were also noted. G. I. R 4

15, 149

Consolazio, C.F., Johnson, R.E. & Pecora, L.J. REPORT OF PHYSIOLOGICAL MEASUREMENTS FOR USE IN THE STUDY OF METABOLIC FUNCTIONS. Proj. 6 60 13 017, Rep. 239, July 1959, 416pp. USA Medical Research and Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

This brochure on physiological measurements revises and brings up to date the procedures used in the study of metabolic functions. These techniques include methods for testing: physical fitness, respiratory metabolism, respiratory gases, blood gases, pulmonary function, body composition, and heat balance through clothing. T. G. I. R 339 (approx.)

15, 150

Birnbaum, A. ON THE ANALYSIS OF FACTORIAL EXPERIMENTS WITHOUT REPLICATION. Contract NONR 266(33), Proj. NR 042 034, CU 36 59 NONR 266(33) MS, Jan. 1959, 26pp. Columbia University, New York, N. Y.

The statistical theory and some representative applications of some new methods for analysis and interpretation of data from factorial experiments without replication are presented. A schematic statistical model which is the formal basis for these methods is detailed, and some critical values computed. These approaches are compared with the conventional inference procedures based on Student's t statistic. Optimal inference rules are described and related to an inference procedure based on a modulus-ratio statistic. The advantages of the latter are discussed. T. R 8

15, 151

Barlow, R.E. & Hunter, L. C. MATHEMATICAL MODELS FOR SYSTEM RELIABILITY. Contract DA 36 039 SC 78281, Engng. Rep. EDL E35, Aug. 1959, 105pp. Sylvania Electric Products, Inc., Mountain View, Calif.

This paper presents "a workable method for determining the reliability of large, complex systems. Repair is an integral part of the model proposed and the usual assumption of component independence is not made." Reliability of the system is defined in terms of a stochastic process. There are two specific applications of the generalized concept. Two types of preventive maintenance policy are presented. The problem of optimal checking procedures is solved for one class of failure distributions. T. G. R 9

15, 152

Alexander, L.T., Ford, J.D., Jr., Jensen, B.T., Jordan, N., et al. PROBLEMS ENCOUNTERED IN DEVELOPING AND MAINTAINING A FIELD SYSTEM TRAINING PROGRAM. SP 107, Sept. 1959, 21pp. System Development Corporation, Santa Monica, Calif.

This symposium includes five papers covering: a) Requirements for a Field System Training Program; b) The Appropriate Contribution of Simulation Techniques to System Training; c) Man-Machine Training

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Techniques--TOR-ing, Feedback, and Debriefing; d) Problems of Conducting System Training in a Military Culture; and e) The Training Problems of Future Systems.

15, 153

Hendler, E. THE EFFECTIVE STIMULUS FOR WARMTH SENSATION IN MAN. Proj. NM 17 01 13 2, Rep. NAMC ACEL 406, Aug. 1959, 10pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

To determine threshold warmth sensation, a central, circular area of forehead skin, blackened or unblackened, of an experienced subject was exposed to radiation from an infrared source. A stimulus was presented; the subject indicated whether or not he had experienced a warmth sensation. Skin temperature was recorded after each exposure, and an interval between exposures allowed this to return to a relatively steady level. Exposure duration and source intensity were varied. T. G. R 14

15, 154

Henderson, W.H. & Winter, R.D. INSTALLATION AND HARNESSING PROCEDURES FOR THE CONTROL SELECTOR MECHANISMS. Tech. Note 9 & Rep. 59 50, Dec. 1959, 9pp. University of California, Los Angeles, Calif.

This report describes prosthetic control mechanisms which provide bilateral shoulder amputees "cross control". The installation of the selector mechanisms and alternator operation are described in addition to the dual control system and its alignment. I. R 2

15, 155

Siddall, G.J. NOTES ON THE DESIGN AND LAYOUT OF CONTROL HANDWHEELS FOR RADAR TRACKING. Tech. Memo. 20, March 1954, 9pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

The design and layout of control handwheels for radar tracking are considered and evaluated in terms of: position of the handwheel relative to the operator, speed of cranking, dimensions, inertia, friction, optimum gear ratios, and directions of movement relative to the display. Recommendations are derived from pertinent studies relating to the above. The appendix contains curves of: error in handwheel tracking as a function of winding speed, optimum cranking rates as a function of load weight and handwheel radii, and travel time and adjustment time for discrete settings of a pointer as a function of gear ratio. G. R 14

15, 156

Strong, R.L. CATEGORY III TEST OF AN INTEGRATED VISUAL APPROACH AND LANDING AIDS (IVALA) SYSTEM. FINAL REPORT. June 1959, 241pp. USAF Strategic Air Command, Westover AFB, Mass.

The Integrated Visual Approach and Landing Aids System was evaluated with particular emphasis on its all-weather aircraft recovery capability. One hundred and twenty-eight landings were completed in visibility conditions of from zero to one-half mile, by line crews flying various types of current operational aircraft. Configuration "A" approach lighting system, Narrow Gauge lighting system, centerline run-out lighting system, and transverse roll guidance bars were evaluated as to their role in the satisfactory guidance for approach and landing in minimal visibility conditions. Detailed data on the design and maintenance of these systems are also presented, and recommendations are set forth. T. G. I.

15, 157

Von Diringshofen, H. OBSERVATIONS ON THE PHYSIOLOGY OF THE SENSES DURING THE TRANSITION FROM ACCELERATIONS TO WEIGHTLESSNESS. From: "Rocket Technology and Space Research, April-June 1959, 3(2), 1-8". Trans. 61, Nov. 1959. USA Feltman Research & Engineering Labs., Picatinny Arsenal, N.J.

This report describes subjective observations during short periods of weightlessness realized through free fall, parabolic flights, and the sling test (laboratory conditions). The period of weightlessness lasted anywhere from 7 to 14 seconds under these conditions. The discussion is aimed particularly at indications of human tolerance of weightlessness as influenced by the transition stage from acceleration to weightlessness. These observations are made with reference to test flights of the rocket plane X-15.

15, 158

Sipple, W.C. & Polis, B.D. A PHYSIOLOGICAL END POINT FOR THE STUDY OF THE TOLERANCE OF SMALL MAMMALS TO HIGH ACCELERATION STRESS. Proj. NM 11 02 12.15, NADC MA 5906, Rep. 1, June 1959, 10pp. USN Aviation Medical Acceleration Lab., Naval Air Material Center, Penn.

This report describes the instrumentation and technique developed to determine an end point for acceleration stress in the rat. Cardiac potential changes were used as the index for determining individual survival limits. Restraint cage, centrifuge and transistor amplifier are diagramed and described. T. I. R 2

15, 159

15, 159

Campbell, F.W. & Westheimer, G. FACTORS INFLUENCING ACCOMMODATION RESPONSES OF THE HUMAN EYE. Contract NONR 495(09), RF Proj. 654, Tech. Rep. 5, Sept. 1959, 4pp. Ohio State University Research Foundation, Columbus, Ohio. (Reprinted from: J. opt. Soc. Amer., June 1959, 42(6), 568-571).

To establish the role of chromatic aberration, spherical aberration and astigmatism in supplying information to the brain on the direction of error in out-of-focus blurring, four subjects adjusted an out-of-focus high-contrast test object until it was in focus. These adjustments were made in a normal optical situation, i.e., with all clues operating in a monochromatic situation, i.e., without chromatic aberration; in a monochromatic plus pupil annulus situation, i.e., without chromatic and spherical aberration; and in a situation with all three clues missing. All subjects were homotropinized; and an artificial pupil was used. Dioptric displacement of the target was recorded. I. R 3

15, 160

Whittenberger, R.K. IMPROVED SEAT AND BACK CUSHIONS. Contract AF 33(600) 27477, Proj. 7215, Task 71724, WADC TR 59 376, Nov. 1959, 26pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Goodyear Tire and Rubber Company, Akron, Ohio).

This report reviews the development of an improved pilot seat and back cushion assembly which would offer optimum comfort and minimum fatigue. Some of the variables studied were: gauge, compression, pressure distribution, and contouring. Several seating materials and seat designs were also tested. Results are presented in terms of adherence to design criteria. Appendices included the data sheets for the cushions, description of the process for producing polyurethane foams, summaries of general properties of foams, etc. T. G. I. R 7

15, 161

Woerden, J. van. UNITERMS: SPACE FLIGHT MEDICINE. UDC: 613.693:629.19, TDCK 16903, Feb. 1959, 45pp. Netherlands Armed Services Technical Documentation and Information Centre, Den Haag, The Netherlands.

This bibliography on space medicine contains summaries of reports and articles compiled from the abstract card indices of the Netherlands Armed Services Technical Documentation and Information Centre. Some of the reports are available on loan from the Centre. The index indicates wide coverage of factors related to space travel; from biological and physiological to psychological variables; design of vehicles and

suits; radiological problems of space flight, etc. One hundred eight abstracts are included. A majority are in English, but some are in German or Dutch.

15, 162

Payne, R.B. TRACKING PROFICIENCY AS A FUNCTION OF THERMAL BALANCE. Tech. Rep. 58 14, May 1959, 10pp. USAF Arctic Aeromedical Lab., Ladd AFB, Alaska.

This experiment investigated the relation between body heat loss and performance decrement in monitoring and controlling a complex visual display, and the effect of glycine administration on such decrement. The USAF SAM Multidimensional Pursuit Test was given to 72 airmen. Considerable training in this task preceded testing. Subjects were assigned to one of nine conditions: three temperatures (70, 55, and 40 degrees F.) and three glycine treatments (0, 20, and 40 grams). A test session consisted of 160 one-minute trials, separated by 15-second rest intervals. The performance scores were treated by analysis of variance technique. T. G. R 12

15, 163

Robinson, E.J. HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION FINAL REPORT. Contract AF30(602) 1579, Aug. 1958, 81pp. Physical Research Labs., Boston University, Boston, Mass.

The effect of presentation speed, target complexity and work load on the precision with which a human observer is able to detect and recognize the number of rectilinear figures appearing in an array which contains noncritical curvilinear figures was investigated. Six subjects had intensive training on the stimulus arrays. Nine experimental conditions were used: three exposures (5, 10, 15 sec.), three numerosity loads (8, 16, 28 figures), three work loads. The data were subjected to analysis of variance. A second experiment which contained some refinements, but otherwise was the same, was run; and the data were analyzed and compared to the earlier findings. T. G. I. R 4

15, 164

Galbraith, H.J. & Snyder, L.D. PERSONNEL NAVIGATION SYSTEM STUDY. FINAL REPORT. APPENDIX 13 - HUMAN FACTORS AND PACKAGING CONSIDERATIONS. Contract DA 36 039 SC 75037, Rep. RLF 3838 1, April 1959, 481pp. Systems Research Lab., Motorola, Riverside, Calif.

This is a preliminary analysis of the operational aspects of the personnel navigator, an equipment to be carried by a foot soldier for self or destination location. The specific operational requirement discussed is its flexibility—all weather and all terrain

IV 283

capability. The major man-machine interaction characteristic discussed is its ease of handling. Rough measurements of linear and angular accelerations that may be expected of a man carrying the navigator were obtained and analyzed briefly. T. G. I.

15, 165

Shearer, J. W., Peterson, D. A. & Slebodnick, E. B. TECHNIQUES FOR HUMAN FACTORS EVALUATION OF PROTOTYPE SPECIAL WEAPONS AND ASSOCIATED EQUIPMENT. SUPPLEMENT II. Contract AF 29(601) 513, Proj. 7800, AIR 259 59 FR 198 Sup. II, AFSWC TR 59 14, July 1959, 200pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

This is an instruction booklet supplementing an earlier report. The Instructions Evaluation Guide and Equipment Evaluation Guide (contained in an earlier report) together contain some 800 items. This supplement contains the 500 items for the Equipment Evaluation Guide. The authors give detailed instruction for using these cards in file card form in the present booklet. Supplements contain the cards for both guides. I.

15, 166

Shearer, J. W., Peterson, D. A. & Slebodnick, E. B. TECHNIQUES FOR HUMAN FACTORS EVALUATION OF PROTOTYPE SPECIAL WEAPONS AND ASSOCIATED EQUIPMENT. SUPPLEMENT I. Contract AF 29(601) 513, Proj. 7800, AIR 259 59 FR 198 Sup. I, AFSWC TR 59 14, July 1959, 80pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

This supplement to an earlier report of the same title contains the cards (300 items) for the Instructions Evaluations Guide. Instructions for use of those cards in file card form are included.

15, 167

Siddall, G. J. & Corkindale, K. G. AN EVALUATION OF LAMAC GLARE GOGGLES. Tech. Memo. 34, June 1955, 12pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

This is an evaluation of the Lamac Glare Goggles for general use. Three general techniques were employed: examination for durability, adjustment ease, etc.; testing of glare effects on acuity; and questionnaire for user opinions. For the second method, five subjects indicated the position of Landolt rings with a central and 45-degree glare source both with and without the goggles. Decision time and error measurements were obtained and analyzed by analysis of variance technique. These findings plus the durability factors and user

opinions are discussed in terms of the range of usefulness of the goggles. T. I. R 2

15, 168

Sweeney, E. J., Kinney, Jo Ann S. & Ryan, Alma P. STANDARDIZATION OF A SCOTOPIC SENSITIVITY TEST. Proj. NM 23 01 20.04.03, Vol. XVIII, No. 3, Rep. 308, March 1959, 8pp. USN Medical Research Lab., Naval Submarine Base, Conn.

A scotopic sensitivity test was examined to determine 1) whether it could measure individual differences in night sensitivity in a sample of enlisted men, and 2) the most efficient means of administering and scoring it. Some reliability and validity checks were made. The test consisted of points of light located 5, 10, and 20 degrees from central fixation on each of the four axes of a quadrant. The intensity was constant at 4.986 log μL , the size was varied in six equal steps: .10 to .25 degrees. The sample was 108 enlisted men. Number of correct responses for each stimulus size for each radial position were obtained and analyzed. Results were also obtained and compared for two testing procedures, monocular vs. binocular viewing, retest, etc. T. G. R 5

15, 169

Schwartz, I. & Dimmick, F. L. COMPARISON OF HIGH ACUITY SCORES ON SNELLEN AND ORTHO-RATER TESTS. Proj. NM 23 01 20.04.01, Vol. XVII, No. 11, Rep. 304, Oct. 1958, 5pp. USN Medical Research Lab., Naval Submarine Base, Conn. (Reprinted from: Amer. J. Optom. & Arch. Amer. Acad. Optom., June 1958, 35(5), 309-313).

High acuity scores on Snellen and Ortho-Rater tests were compared in order to determine their size relationship and to set up a transformation equation of score from one test to the other. A total of 1,071 scores in each of the tests was obtained. The correlation ratio and coefficient of correlation were obtained. Prediction from one score to the other is discussed, and conversion scores are presented. T. G. I. R 2

15, 170

Schaefer, K. E., McNulty, W. P., Jr., Carey, C. R. & Liebow, A. A. MECHANISMS IN DEVELOPMENT OF INTERSTITIAL EMPHYSEMA AND AIR EMBOLISM ON DECOMPRESSION FROM DEPTH. Proj. NM 24 02 20.02.01, Vol. XVII, No. 7, Rep. 300, July 1958, 15pp. USN Medical Research Lab., Naval Submarine Base, Conn. (Reprinted from: J. appl. Physiol., July 1958, 13(1), 15-29).

To determine the effects on intracavitary and intravascular pressures of decompression from depth with the airway opened and closed, to determine some mechanisms of air embolism, and to determine the effects of thoracoabdominal binders

15, 171

on such pressures, dogs appropriately prepared were so compressed to 100 and 200 feet, and recordings taken during decompression. Trachea open and closed, binders and no binders were compared for the following kinds of records: intratracheal pressure, lung distension, systemic aortic pressure, pulmonary arterial pressure, left atrial pressure. Significance for understanding production of air embolism is discussed. T. G. I. R 20

15, 171

Rao, U. V. R., Savage, I. R. & Sobel, M. CONTRIBUTIONS TO THE THEORY OF RANK ORDER STATISTICS: THE TWO-SAMPLE CENSORED CASE. Contract NONR 2582(00), Task NR 042 200, Tech. Rep. 8, Sept. 1959, 19pp. University of Minnesota, Minneapolis, Minn.

In this article rank order theory is developed for the two-sample problem in which not all of the random variables are observed, i.e., the observations have been censored. The approach is similar to the regular two-sample case except in the consideration of likelihood ratios of rank orders. Several censoring rules and terminal procedures are presented and discussed. R 4

15, 172

Van Den Brink, G. & Bouman, M. A. VISUAL ACUITY DEPENDING ON SPHERICAL CORRECTION. Ophthalmologica, Sept. 1959, 138(3), 222-224. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

The results of some experiments on state of accommodation and its relation to dioptrical power are briefly discussed. Measurements of visual acuity were made for several values of spherical power at a number of luminances. The relationships among these factors are briefly indicated. G. 1.

15, 173

Vos, J. J. ABOUT THE DANGER OF OCULAR LESIONS BY INFRARED SEARCH-LIGHTS. Rep. IZF 1959 8, ca. 1959, 8pp. Institute for Perception RVO-TNO, Soesterberg, The Netherlands.

This report discusses the possible danger of ocular injuries from infrared radiation. Using data from other sources, the effective thermal dose upon the iris diaphragm is calculated and compared tabularly with other data. Results from a previous study by the author are used to calculate the temperature rise in the retina. These two indices are evaluated in terms of potential ocular lesions. T. G. R 4

15, 174

Vos, J. J. A THEORY OF RETINAL BURNS. Rep. IZF 1959 6, ca. 1959, 26pp. Institute for Perception RVO-TNO, Soesterberg, The Netherlands.

A quantitative formulation of the generation, conduction, and convection of heat is applied to the occurrence of functional damage of the retina by heat. Experiments by W. T. Ham, et al., on retinal flashburns in rabbit eyes were then analyzed. In general, a satisfactory explanation did not use the critical temperature level concept, which proved too simple, but was in terms of "equal steam production". G. I. R 8

15, 175

USN Aviation Safety Center. AIRCRAFT MAINTENANCE ERROR STUDY. 1958, 39pp. USN Aviation Safety Center, Norfolk, Va.

This report for the calendar year 1957 covers all aircraft accidents in which primary and/or secondary cause was maintenance, service, or supervisory error. The accidents or incidents were broken down by aircraft system involved. The authors state that basic causes for maintenance errors among all model aircraft were fundamentally the same, and point out that pilots and maintenance personnel should read the narrative for all models. Most of the errors fall within the categories of 1) improper and incomplete security of equipment, 2) improper adjustments, and 3) leaving loose objects adrift. 1.

15, 176

Wheaton, J. L. FACT AND FANCY IN SENSORY DEPRIVATION STUDIES. Rev. 5 59, Aug. 1959, 60pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

This study was undertaken to provide a comprehensive review of the literature, and to separate "fact from fancy" in reports of work in the area of sensory deprivation. Research leading to current studies on sensory deprivation are discussed. Summaries of published reports cover autobiographic, anecdotal, clinical, and experimental literature. Present knowledge of isolation effects on human behavior is summarized. There is a discussion of probable implications for space travel and military use. R 211

15, 177

Kinney, Jo Ann S. COMPARISON OF SCOTOPIC, MESOPIC, AND PHOTOPIC SPECTRAL SENSITIVITY CURVES. Proj. NM 22 01 20, 01.04, Vol. XVII, No. 2, Rep. 295, March 1958, 6pp. USN Medical Research Lab., Naval Submarine Base, Conn. (Reprinted from: J. opt. Soc. Amer., March 1958, 48(3), 185-190.).

Spectral sensitivity curves were measured for the ten-degree periphery for a range of intensities from absolute scotopic threshold to five log units above threshold under two surround conditions—complete darkness and light level under investigation. Also, a spectral sensitivity curve was measured for the fovea at one level. Five

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observers participated. Thresholds were obtained at 10 mu intervals from 430 to 640, by the method of limits, after appropriate adaptation. Comparisons of scotopic, mesopic, and photopic sensitivities, and of foveal and peripheral sensitivities were made graphically and discussed. G. R 8

15, 178

Alexander, L. T. REQUIREMENTS FOR A FIELD SYSTEM TRAINING PROGRAM. From: Problems Encountered in Developing and Maintaining a Field System Training Program, SP 107, Sept. 1959, 1-4. System Development Corporation, Santa Monica, Calif.

This brief paper describes the Aircraft Controlling and Warning Radar Net. The need to develop skills of individual operators, plus interactive skills such as pacing, load balancing, etc., is discussed. Problems of motivation and morale are introduced. Factors responsible for preventing development of good morale, or of reducing morale, are discussed. Also discussed are the importance of knowledge of results and the need to develop techniques to reduce deleterious effects of rapid turnover of personnel. A system training exercise is described.

15, 179

Rogers, M. S. THE APPROPRIATE CONTRIBUTION OF SIMULATION TECHNIQUES TO SYSTEM TRAINING. From: Problems Encountered in Developing and Maintaining a Field System Training Program, SP 107, Sept. 1959, 5-8. System Development Corporation, Santa Monica, Calif.

The rationale for the use of simulated materials and eight principle findings concerning the contribution of simulation techniques to a System Training Program are presented in this paper. Problems such as those arising from inaccurate simulation materials and from the use of materials which are too sophisticated are discussed.

15, 180

Jordan, N. MAN-MACHINE TRAINING TECHNIQUES-TORING, FEEDBACK, AND DEBRIEFING. From: Problems Encountered in Developing and Maintaining a Field System Training Program, SP 107, Sept. 1959, 9-12. System Development Corporation, Santa Monica, Calif.

This report discusses three aspects of a System Training Program: a) "Training Operations Report", or information gathered by observers of the crew's performance during a training exercise, especially as this has been developed for SAGE; b) feedback, or the objective and accurate account of factual performance; and c) debriefing. Payoffs of a program with "good" debriefings are discussed.

15, 181

Jensen, B. T. PROBLEMS OF CONDUCTING SYSTEM TRAINING IN A MILITARY CULTURE. From: Problems Encountered in Developing and Maintaining a Field System Training Program, SP 107, Sept. 1959, 13-16. System Development Corporation, Santa Monica, Calif.

This paper mentions some problems arising from the conduct of system training procedures and programs within a military setting. The debriefing aspect of a training program appears to be most at variance with military culture. Two general conditions are discussed which contribute to effective use of debriefing in this setting. The necessity to relate training program to procedures of personnel as well as to procedures of the operating system is pointed out.

15, 182

Ford, J. D., Jr. THE TRAINING PROBLEMS OF FUTURE SYSTEMS. From: Problems Encountered in Developing and Maintaining a Field System Training Program, SP 107, Sept. 1959, 17-21. System Development Corporation, Santa Monica, Calif.

The purpose of this paper is to review the model of the System Training Program to evaluate its strengths and weaknesses. These are discussed in terms of three assumptions: 1) major training problems exist in a system context; 2) information reported in feedback emphasizes task relevant behavior; and 3) that this is a group problem solving model. Characteristics of the system training model are examined in terms of problems of making it work in a semi-automatic data processing system.

15, 183

Chapanis, A. RESEARCH TECHNIQUES IN HUMAN ENGINEERING. 1959, 316pp. The Johns Hopkins Press, Baltimore, Md.

This text describes some methods for collecting data on men and machines and their interrelationships, and discusses some principles and guide lines for ways of doing dependable studies on people. Specifically covered are: methods of direct observation, methods for study of accidents and near-accidents, statistical methods, the experimental method, psychophysical methods, and articulation testing methods. T. G. I. R 118

15, 184

Harcum, E. R. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD II NINE-ELEMENT TYPE-WRITTEN TARGETS. Proj. MICHIGAN, Rep. 2144 293 T., Dec. 1958, 25pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

To study visual recognition of targets (composed of binary elements) presented along various meridians, 20 observers (ten experienced, ten inexperienced) recorded on a matrix target patterns which were presented on the W-E, NW-SE, W-E, or NE-SW meridian of the visual field. Target exposure was approximately 0.1 second; luminance of field approximately 6.8 foot-lamberts. Observers were sometimes informed in advance which meridian would be used. The different experimental and subject conditions were tested by the Friedman two-way analysis of variance. T. G. I. R 43

15, 185

Field, Sally M. & Davis, S.W. (Eds.). FATIGUE AND STRESS SYMPOSIUM 24 - 26 JANUARY 1952. Proj. DOUGHBOY, Tech. Memo. ORO T 185, Sept. 1952, 139pp. Operations Research Office, Johns Hopkins University, Baltimore, Md.

This symposium was aimed at providing background knowledge and experience in the areas of fatigue and stress. Each of nine researchers presented a summary of the pertinent information in his field and recommended possible measurement techniques for use under combat conditions and in future research. T. G.

15, 186

Luizov, A.V. PERCEPTION OF BRIEF VARIATIONS IN BRIGHTNESS. NSF TR 199, Feb. 1954, 3pp. National Science Foundation, Washington, D.C.

This paper was aimed at establishing the relation between contrast in time and duration of brightness change at the threshold of discrimination. Four observers viewed a dark field on which a 14-foot light spot was presented and judged whether or not they had seen the flicker when a pendulum and shutter passed before it. The data were discussed in terms of the dependence of perceived brightness on the time-varying luminance. T. I. R 8

15, 187

Libber, L.M., Santa Maria, L.J. & Tiller, P.R., Jr. ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS. PART 4. PHYSIOLOGICAL CHANGES PRODUCED IN HUMANS BY PROLONGED CONFINEMENT IN AN OXYGEN-RICH ENVIRONMENT. Proj. TED NAM AE 1403, Rep. NAMC ACEL 386, Oct. 1958, 9pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

To determine whether the combined effects of decrease in food palatability and a simulated altitude of 10,000 feet would have pronounced effect on food and water intake, six subjects spent a seven-day test period in a simulated space vehicle. Results are discussed in terms of weight loss; urine

was tested for specific gravity, output, and presence of a stress substance. Recommendations are made for further research.

T. G. R 10

15, 188

Leisinger, J. (Dir.). SCIENTIFIC REPORTS ON INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES IN CZECHOSLOVAKIA. Vol. 3, 1958, 162pp. Institute of Industrial Hygiene and Occupational Diseases in Prague, Prague, Czechoslovakia.

This volume abstracts all of the papers published on industrial medicine by the Institute of Industrial Hygiene and Occupational Diseases in Prague and by other "Institutes and Scientific Arrangements in Czechoslovakia" for the year 1958. Some specific topics are: dust, shocks, radiation, high and low temperatures; also reported are studies in toxicology, and studies on occupational diseases of skin, blood, nervous system, etc. R 309

15, 189

Dale, H. C. A. A PRIORI PROBABILITIES IN GAMBLING. Nature, March 1959, 183, 842-843. (Applied Psychology Research Unit, MRC, Cambridge, England).

To examine the question of a priori probabilities directly, subjects were questioned before they began to play at a laboratory gambling task. One hundred thirty-one subjects used in the first experiment had a choice of three bets, of long, short, and medium odds. In the second experiment 142 subjects were given only one pay-off matrix, in which it paid to avoid the bet with long odds. Results are discussed as they relate to previous findings that individuals tend to over-estimate the frequency of occurrence of infrequent events and underestimate that of comparatively frequent ones. T. R 5

15, 190

Broadbent, D.E. INFORMATION THEORY AND OLDER APPROACHES IN PSYCHOLOGY. Reprint from: 'Proceedings of the Fifteenth International Congress of Psychology', 1959, 111-115. North Holland Publishing Co., Amsterdam, Holland. (Applied Psychology Research Unit, MRC, Cambridge, England). (APU 344/58).

The author holds that information theory, far from having exhausted its usefulness to psychology, does provide an "objective language for discussing events within the nervous system," and... "puts a new emphasis on the process of discriminating the actual sensory event from other possible ones, which older approaches have neglected." Experiments which have raised doubts as to usefulness of the theory are discussed. R 10

15, 191

Dale, H.C.A. & Brown, I.D. AN APPARATUS FOR INVESTIGATING CERTAIN ASPECTS OF FAULT-FINDING. APU 318/58, Aug. 1958, 9pp. Applied Psychology Research Unit, MRC, Cambridge, England.

An apparatus is described which can be used to study the strategies which subjects use when searching in different kinds of systems. The apparatus is designed specifically to provide a means for investigating one aspect of the task of searching for a fault in electronic equipment, and is described in some detail. Ideal methods of diagnosis are described, then related to behavior of the maintenance engineer. I. R 4

15, 192

Broadbent, D.E. EFFECT OF NOISE ON AN "INTELLECTUAL" TASK. J. acoust. Soc. Amer., Sept. 1958, 30(9), 824-827. (Applied Psychology Research Unit, MRC, Cambridge, England.)

To investigate the effect of noise on an "intellectual" task (mental arithmetic), and to determine whether the effect appears to carry over from one day to the day following exposure, 18 subjects performed a task which required the storage of digits in immediate memory. Subjects, divided into three groups, performed the task 1) in 70-db noise on both days, 2) had 70-db noise the first day and 100-db noise the second day, and 3) had 100-db noise the first day, and 70-db noise the second. Results are given in terms of errors in the task and time required to look at the problem before calculating. Individual differences are discussed as they relate to intelligence, to introversion, and to extroversion. G. R 12

15, 193

Dennis, J.P. & Siddall, G.J. THE STRAUSSLER EXPERIMENTAL VEHICLE: AN EVALUATION OF THE DISPLAYS, CONTROLS AND SEATING FOR EFFICIENCY AND COMFORT IN OPERATION. Tech. Memo. 38, Jan. 1956, 4pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

This article describes and evaluates the Straussler experimental vehicle which was designed to be extremely maneuverable over rough and marshy country. The seating and controls and displays are detailed and improvements suggested. R 3

15, 195

Cron, B.F. & Martin, R.L. STATISTICAL-DECISION OBSERVER TESTS. NE 051600 22A, 1 501 02 00, USL Research Rep. 400, Oct. 1958, 17pp. USN Underwater Sound Lab., Fort Trumbull, Conn.

This report evaluates the efficiency of the human sonar observer in detecting

the presence of signal in a noise background by comparing his decisions with those of the ideal statistical observer for a given set of conditions. The reasoning and sensory factors were separately tested in several situations. The main parameters include processing time, utility and a priori probability of noise alone. The continued application of statistical decision theory to multistage decision tests and games of conflict is recommended. G. I.

15, 196

Bowen, H.M., Andreassi, J., Truax, S., & Orlansky, J. OPTIMUM SYMBOLS FOR RADAR DISPLAYS. Contract NONR 2682(00), Sept. 1959, 33pp. Dunlap and Associates, Inc., Stamford, Conn.

The experiments described in this report were conducted to discover 1) sets of geometric symbols which could be recognized with high accuracy under a variety of display conditions and discriminated from each other, and 2) the size and stroke width to height ratio desirable for symbols to be used on complex displays. Absolute discriminability was established for a set of 20 geometric shapes, and makes possible the selection of a set of geometric shapes which will seldom be confused. The study was specifically oriented towards radar displays. Recommendations were made regarding appropriate dimensions of such symbols. T. G. I. R 42

15, 197

Bartlett, Susan C., Beinert, R.L. & Graham, J.R. STUDY OF VISUAL FAULT DETECTION AND EFFICIENCY IN RADAR OBSERVATION FINAL REPORT. Contract AF 30(602) 667, RADC TR 55 100, 1955, 70pp. Dept. of Physics, Hobart College, Geneva, N.Y.

Three experiments are reported in which the effects of luminance of sweeping sector background, speed of rotation of the sweep, and intermittence of appearance of pips on radar observer efficiency and visual fatigue were studied. Luminances were .003, .03, and .3 ml; speeds were 4, 6, 10, and 15 rpm; intermittencies varied. Three naive subjects monitored a radarscope for one or two-hour watches and reported each time a target appeared. Phorias were measured before and after each session. Target detection data were subjected to analysis of variance. Individual variability is discussed. T. G. I. R 19

15, 198

Bloom, F.J. SUPPLEMENTARY NOTES ON EVALUATION THEORY FOR COMMUNICATION SYSTEMS THIRD QUARTERLY REPORT. Contract AF 19(604) 1049, Dec. 1954, 14pp. USAF Cambridge Research Center, Bedford,

15, 199

Mass. (New York University, New York, N. Y.)

A quarternary PCM system is analyzed. Information rate and probability of error were obtained by determination of the transition probabilities at the various points in the system and by specification of a decoder. A supplementary note establishes an easily calculable means for setting upper and lower bounds on the error entropy for a discrete b-level system. G. I.

15, 199

Felton, W. W. & McLaughlin, F. X. TEST DESIGN, DATA COLLECTION AND STATISTICAL ANALYSIS FOR COMMON SYSTEM EXPERIMENTATION. FINAL REPORT. Contract AF 19(604) 1966, Proj. 4999, Task 46299, F A1998, AFCRC TR 58 185, Aug. 1958, 66pp. USAF Cambridge Research Center, Bedford, Mass. (Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.).

This report measures and analyzes "the location of aircraft with respect to reporting points and airways at the time of passage noted on IFR flight progress strips". Altogether 1000 aircraft were observed at 40 reporting points. Deviations from the airway centerline were tabulated. Suggestions for improving position reporting accuracy are indicated. In addition, wind variability and wind estimating methods were evaluated. T. G. I.

15, 200

Bowen, H. M. THE RADAR SIGNAL AND THE HUMAN OBSERVER. June 1954, 12pp. Applied Psychology Research Unit, MRC, Cambridge, England.

This paper attempts to define the optimum match between the variable features of the radar display and the visual and mental abilities of the human observer. Brief reviews of relevant findings on signal detection as a function of noise, background brightness; on signal location and tracking as a function of scale, display size; on the effect of ambient illumination; and on the effect of operator alertness are presented.

15, 201

Crutchfield, R. S., Woodworth, D. G. & Albrecht, Ruth E. PERCEPTUAL PERFORMANCE AND THE EFFECTIVE PERSON. Contract AF 18(600) 8, Proj. 7730, Task 77353, WADC TN 58 60, April 1958, 85pp. USAF Personnel Lab., Lackland AFB, Tex. (University of California, Berkeley, Calif.).

To explore the potential contribution of a number of perceptual tests in assessing and understanding the personality of the effective person, ten perceptual-cognitive tests were administered to 100 Air Force captains. Some of the tests were: size-weight illusion,

perception of vertical, Gottschaldt figures. The subject was scored on each test according to the measure(s) derived from it. These measures were correlated with all 600 other scores obtained for such areas as intellect, interests, emotional adjustment, etc. They were also compared with certain Air Force criterion measures of military effectiveness. T. I. R 11

15, 202

Clark, W. C. & Blackwell, H. R. RELATIONS BETWEEN VISIBILITY THRESHOLDS FOR SINGLE AND DOUBLE PULSES. Proj. MICHIGAN, Rep. 2144 343 T, April 1959, 31pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

The relation between detectability and certain aspects of the temporal characteristics of targets was systematically investigated. Targets were single continuous pulses which varied in duration and double pulses which varied in temporal separation; background luminance was varied for both. Detection thresholds were obtained by the method of constant stimuli on seven observers. The threshold data were used to evaluate the temporal-contribution mathematical model in terms of its predictive value and some of its assumptions. T. G. I. R 65

15, 203

Abramson, N. M. APPLICATION OF "COMPARISON OF EXPERIMENTS" TO RADAR DETECTION AND CODING PROBLEMS. Contract NONR 225(24), NR 373360, Tech. Rep. 41, July 1958, 85pp. Stanford University, Stanford, Calif.

This paper develops some practical methods for comparing experiments with an infinite as well as a finite number of outcomes. This technique, "comparison of experiments", deals with the data upon which the decision is based, not the making of decisions. The methods developed were then applied to radar detection and elementary binary coding examples. G. I. R 11

15, 204

Andrews, T. G. & Ross, S. INDICATORS OF BEHAVIOR DECREMENTS SUMMARY REPORT ON SECOND YEAR OF OPERATION. Proj. DA 49 007 MD 222 (O. I. 19 52), Tech. Rep. 23, No Date, 12pp. University of Maryland, College Park, Md.

This report summarizes a year of research devoted mainly to the study of higher levels of behavior organization under stress. Some of the variables investigated were: protracted performance of visuo-motor discriminations under monotony, differential ego-involvement in various tasks, differential individual anxiety, administrative pressure. The types of behavior studied include: vigilance, reasoning and problem solving, and visual tracking.

IV 289

15,212

15,205

Clements, R., Archer, J.W., Hays, Ruth & Schoening, Joyce K. THE EFFECTS OF CHLOROQUINE ON THE SPEED OF VISUAL ACCOMMODATION IN MAN. Contract AF 41(607) 44, Proj. 21 1601 0005, Nov. 1953, 7pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (The University of Texas Medical Branch, Galveston, Tex.).

To determine the effects of chloroquine on the speed of visual accommodation, some 500 subjects performed at a tachistoscope visual accommodation task. Subjects were given varying doses of chloroquine once a week for 52 weeks. Pre- and post-drug administered accommodation data were compared with accommodation data obtained from subjects receiving placebos. The results were utilized in evaluating existing opinion about the effects of chloroquine on vision. T. I. R 12

15,206

Eddowes, E. D. DETECTION OF STATISTICALLY DEFINED PATTERNS IN A MATRIX OF DOTS. Human Factors Data Bull. 44, Nov. 1959, 3pp. Westinghouse Electric Corporation, Baltimore, Md.

A series of experiments were reported which investigated problems in the detection of patterns on noisy displays. The displays were based on a square matrix of dot positions which provided vertical or horizontal bar patterns with varying numbers of dots (noise) in alternate bars. Conditions investigated were 1) amount and kind of noise (dot number and separation), 2) number of bars, 3) exposure time, and 4) multiple exposure. Subjects were required to determine if any given test display contained vertical or horizontal patterns. The results were discussed in terms of statistical properties of the stimuli. G. I. R 1

15,208

Fightmaster, W.J. PLANNING FOR MAINTAINABILITY. Human Factors Data Bull. 43, Oct. 1959, 2pp. Westinghouse Electric Corporation, Baltimore, Md.

In this report, information that can be used in planning the design of equipment to minimize maintenance problems (maintenance of operational equipment with minimum "down" time) is considered. The following general areas particular to the human factor in equipment maintenance are reviewed: physical activities, physical dimensions, weight-lifting capacity, and characteristics and types of errors unique to the maintenance man. T. R 1

15,209

Enoch, J. M. EFFECT OF THE SIZE OF A COMPLEX DISPLAY UPON VISUAL SEARCH. J. opt. Soc. Amer., March 1959, 49(3), 280-286.

To determine the effect of the size of a complex display upon natural visual search tendencies, 12 subjects were presented an ordered series of seven experimental aerial maps of different visible area. Eye traces were recorded on a modified ophthalmograph while they searched for a specific critical detail. Eye traces were analyzed in terms of: 1) average duration of fixation and average interfixation distance, 2) percent of eye fixations falling outside of the display area, and 3) analysis by zones. Distributions of the percentage of eye fixations were submitted to quadrant analysis. Discussion is in terms of optimum display sizes and typical zones of fixation. T. G. I. R 12

15,210

Fraser, D. C. THE STUDY OF FATIGUE. Aug. 1954, 5pp. RAF Institute of Aviation Medicine, Farnborough, Hants, England.

In order to arrive at an objective definition of fatigue, pertinent research is reviewed and evaluated in terms of established principles and tests for fatigue. The results are discussed which were obtained by studying fatigue as change in control sensitivity occurring during a prolonged visual task. Changes in fatigue are inferred from changes in subject's variance around his own mean. Neither the data or its analysis are presented in this report. An objective, operational definition of fatigue is presented.

15,211

Blackwell, H.R. & Smith, S.W. THE EFFECTS OF TARGET SIZE AND SHAPE ON VISUAL DETECTION II CONTINUOUS FOVEAL TARGETS AT ZERO BACKGROUND LUMINANCE. Proj. MICHIGAN, Rep. 2144 344 T, Jan. 1959, 23pp. Vision Research Labs., University of Michigan, Ann Arbor, Mich.

This paper reports results of studies in which the luminance difference for threshold detectability was measured for 45 targets of various shapes and sizes against zero background luminance. Using foveal presentation, measurements were made on eleven observers using the method of constant stimulus with the temporal forced-choice procedure. The data were subjected to both empirical and theoretical analysis. T. G. I. R 8

15,212

Tanner, W.P., Jr. PSYCHOPHYSICAL APPLICATION OF THE THEORY OF SIGNAL DETECTABILITY. Contract DA 039 SC 15358, Proj. M970, DA Proj. 3 99 04 042 & SC Proj. 29 194 B 0, Task EDG 6, EDG Tech. Rep. 18 & Rep. 1970 5 S, Feb. 1954, 12pp.

Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

The detection of light signals in a uniform light background was used to demonstrate experimentally the internal consistency of a new theory which defines the form of data expected from such "yes-no" and "forced-choice" psychophysical experiments. This theory assumes: 1) false alarm rate and correct detection vary together, 2) neural activity is a monotone increasing function of light intensity, 3) all stages prior to cortex function only in transmission of information. Hypothetical detection curves are presented and the data are analyzed in terms of these. G. I. R 2

15,214

Smith, S.W., Blackwell, H.R. & Cutchshaw, C.M. THE EFFECTS OF TARGET SIZE AND SHAPE ON VISUAL DETECTION III EFFECTS OF BACKGROUND LUMINANCE, DURATION, WAVELENGTH, AND RETINAL LOCATION. Proj. MICHIGAN, Rep. 2144 346 T, Dec. 1958, 17pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

To determine the extent to which non-circular targets are less detectable than circular ones of equal area, circles, rectangles, and a cross were presented in the rod-free fovea to eight observers using the temporal forced-choice psychophysical method. Five target luminances, three target durations, and four background luminances were tested. Also an eight degree peripheral location and red and green targets were examined for some conditions. The results are considered in terms of a theoretical analysis based upon the element contribution hypothesis. T. G. R 11

15,215

Vanderplas, J.M. RADAR OPERATOR VISUAL FATIGUE A SUMMARY OF AVAILABLE EVIDENCE AND SOME PRELIMINARY SUGGESTIONS FOR THE REDUCTION OF VISUAL FATIGUE. RDO 694 45, WCRD TN 52 44, Aug. 1952, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report constitutes a survey of the pertinent literature on the problem of visual fatigue, with emphasis given to the application of the literature to problems of visual fatigue encountered by radar operators on long missions. A summary is presented of the evidence on objective measures of visual fatigue and factors (either general or specific) in illumination, contrast, size of objects, viewing distance, motivation, attention and distraction, rest periods, sweep line, brightness and eye movements, which may contribute to visual fatigue of radar operators. Preliminary suggestions are made for possible reduction of visual fatigue. R 27

15,216

Whitmore, P.G. SOME PROBLEMS IN THE ANALYSIS OF TROUBLE SHOOTING BEHAVIOR. Research Rep. 2, Oct. 1959, 26pp. Human Resources Research Office, George Washington University, Washington, D. C.

To determine for the NIKE AJAX IFC system effective trouble shooting procedures, knowledge and skills which contribute to these procedures, training necessary for the skills, and to derive generalized maintenance principles from comparison between the M33 and the above system, the present research was conducted. The data used for the present analysis had been collected mainly in three previous studies on electronics maintenance training, and from a multiple-choice test given to maintenance people. The activity category system was modified and added to in order to better discriminate between various forms of activity. T. R 7

15,217

Taylor, F.V. & Garvey, W.D. THE LIMITATIONS OF A 'PROCRUSTEAN' APPROACH TO THE OPTIMIZATION OF MAN-MACHINE SYSTEMS. Ergonomics, Feb. 1959, 2(2), 187-194. (USN Research Lab., Washington, D. C.).

Two basic approaches to optimize the performance of man-machine systems are discussed: one which attempts to adjust the human component by training, the other to adjust the mechanical elements to fit the man. Limitations of the training approach are indicated, and a study is reported which compares the effectiveness of resultants of the two approaches under "task-induced" stress situations. G. I. R 8

15,218

Slecht, R.F., Forrest, J., Carter, W.K. & Wade, E.A. COMFORT EVALUATION OF THE C-97A/KC-97E PILOT SEAT (WEBER) ONE OF A SERIES OF STUDIES PERTAINING TO THE DESIGN EVALUATION OF PILOT AND CREW STATION EQUIPMENT. Contract AF 33(616) 3068, Proj. 7215, Task 71724, WADC TR 58 313, Nov. 1959, 16pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University, Medford, Mass.).

This study evaluated certain design characteristics of the Weber Pilot Seat in terms of human comfort. Method of evaluation was a battery of subjective and behavioral laboratory tests administered by means of hourly questionnaires. Sixteen subjects sat for a period of seven hours, getting up when their discomfort was intolerable. The subjective tests include rating the seat and rating the discomfort of several body regions. Also, the number of minutes the subjects were seated was measured. T. G. I. R 1

15, 219

Tiller, P.R. & Figur, A.M. ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS--A SECOND STUDY PART 4: CONCENTRATIONS OF EPINEPHRINE AND NOREPINEPHRINE IN URINE DURING CONFINEMENT IN A SIMULATED SPACE CHAMBER. Proj. TED NAM AE 1403, Rep. NAMC ACEL 416, Nov. 1959, 8pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

To measure the effects of stress that a spaceship crew would experience while living together in a confined area and performing various tasks, concentrations of epinephrine and norepinephrine in urine were estimated on six men prior to, during, and after eight days confinement. The mean and standard deviations are presented and compared to those obtained under normal circumstances. Results of earlier studies in this series are also discussed. T. R 13

15, 220

Whittenburg, J.A. METHODOLOGY FOR EVALUATION OF A MAN-MACHINE SURVEILLANCE SYSTEM. Contract NONR 2525 (00), HSR RM 59/26 SM, Rep. 6, Dec. 1959, 19pp. Human Sciences Research Inc., Arlington, Va.

"To determine the performance capabilities and limitations of the human as a component of a weapon system not-in-being", with specific focus on the capabilities of the human as an aerial observer, this paper presents methodological requirements and reports steps taken to meet them in research which were reviewed. Data from the studies which were reviewed are presented in a series of charts which show relationships, differences, and point up need for further research. I. R 16

15, 221

Siddall, G.J. & Anderson, D.M. DISPLAY AND CONTROL RECOMMENDATIONS FOR A FILM READER. Tech. Memo 54, Aug. 1956, 8pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

Film reader equipment is examined and recommendations made for the design of individual items and their associated layouts. Included are: task analysis, item (equipment components) analysis, arrangements for combining all items, and seating arrangements. The appendix contains drawings of: the layout of main components, recommended layout of switch panel, and a recommended seat. T. I.

15, 223

Ussher, T.H. CONDITIONAL FEEDBACK APPLIED TO HUMAN OPERATOR TESTING. Extramural Res. Grant 9401 15,

Res. Rep. 22, Oct. 1959, 72pp. Dept. of Electrical Engineering, University of Toronto, Toronto, Ontario, Canada.

A method of display called a "conditional feedback" display was defined and compared with pursuit and compensatory systems. An IBM 650 digital computer was used to obtain average system step-responses. The systems were compared on the basis of error growth curves. Choice of optimum display was on the basis of minimum input-output error. T. G. I. R 11

15, 224

Lit. A. THE EFFECT OF TARGET VELOCITY IN A FRONTO-PARALLEL PLANE ON BINOCULAR SPATIAL LOCALIZATION AT PHOTOPIC ILLUMINANCE LEVELS. Proj. MICHIGAN, Rep. 2900 18 T, April 1959, 10pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

To determine the magnitude of localization error for a black vertical rod which oscillates in a given fronto-parallel plane as a function of target velocity at each of three specified photopic levels of binocular retinal illuminance, two practiced subjects made binocular settings of equidistance in a two-rod test apparatus that provided "real"-depth cues. The ten target velocities ranged from 1.49 degrees/second to 39.09 degrees/second and the three photopic levels of retinal illuminance were 2.06, 3.13, and 3.64 log trolands. Localization errors are plotted as a function of target velocity and level of illumination. The results are discussed in relation to existing experimental data. T. G. I. R 9

15, 225

Lane, J.C. & Cumming, R.W. PILOT OPINIONS AND PRACTICES ON THE APPROACH TO LANDING: A QUESTIONNAIRE SURVEY AMONG AUSTRALIAN CIVIL AND MILITARY PILOTS. Rep. ARL HE 1, April 1959, 72pp. Aeronautical Research Labs., Australian Defence Scientific Service, Melbourne, Australia.

In this report replies to two questionnaires on pilot opinions and practices on the approach to landing are analyzed question by question. Eight hypotheses concerning pilot opinion and practice in approach to landing are tested. Questionnaire items concern types of aircraft flown, approach preferences, touch down point, information used in controlling the descent path, pilot opinion on risk of undershoots and overshoots, visual cues to glidepath and numerous other variables. Instructor questionnaire replies are compared with operational pilot questionnaire replies. The approacher contains sample questionnaires. T. G. I. R 7

15, 226

Turner, A.S. APPLICATION AND EXTENSION OF SEQUENTIAL DECISION

THEORY TO THE RADAR SEARCH PROBLEM. USN Bureau of Ordnance (NORD 14362), M.I.T. Lincoln Lab. (DDL B 157), Tech. Rep. 4, May 1957, 62pp. Massachusetts Institute of Technology, Cambridge, Mass.

Application and extension of sequential decision theory to two basic search problems (with emphasis on the optimum nature of sequential detection of signals in noise): 1) to establish a fixed-reliability minimum-time search, utilizing a pulsed, early warning search radar with a single electronically scanned antenna and fixed guard range gate. Possible time savings as a function of truncated sequential detection versus fixed-sample detection are discussed; 2) to establish a fixed-time maximum reliability search utilizing a pulsed beam-rider guided-missile seeker with a single scanned gate. Appendix A contains discussion of a scheme for instrumenting a sequential detector for pulsed signal in normal noise. T. G. I. R 17

15, 228

Simon, B. (Ed.). PSYCHOLOGY IN THE SOVIET UNION. 1957, 305pp. Stanford University Press, Stanford, Calif.

This book, a collection of papers by Soviet psychologists, is intended to familiarize English readers with the general direction of Soviet psychology. The philosophical basis of Soviet psychology and a brief summary of its present organization serve as introduction. The topic areas include: higher nervous activity and perception, psychology of understanding, role of language in formation of temporary connections, spatial discrimination, theory of memory, child psychology, objective method in psychology. T. R 69

15, 230

Kincaid, W. M. THEORETICAL MODELS FOR THE DISCRIMINATORY PROCESS IN VISUAL DETECTION. Proj. MICHIGAN, Rep. 2144 281 T, Jan. 1959, 9pp. Vision Research Labs., University of Michigan, Ann Arbor, Mich.

This paper attempts to clarify thinking about the nature of the discriminatory process involved in visual detection. A variety of theoretical models (e.g., simple threshold, theories of signal detection in the presence of noise) are shown to be variants of a more general model. The more general model is "expressed in terms of an abstract space corresponding with the set of possible states of the central nervous system". Different subsets of this space correspond to different responses. Suggestions for further research are included. R 8

15, 231

Harcum, E. R. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL

FIELD. VI. 8-ELEMENT AND 10-ELEMENT BINARY PATTERNS. Proj. MICHIGAN, Rep. 2144-303 T, Nov. 1958, 18pp. Vision Research Labs., University of Michigan, Ann Arbor, Mich.

To study the recognition capacity of human observers, 17 observers were shown linear binary patterns which were presented tachistoscopically at inclinations of 0, 45, 90, and 135 degrees in the visual field. Eight-element and ten-element targets were used. Mean errors per observer per presentation were analyzed for differences among the various pairs of meridians. This experiment was sixth in a series devoted to testing visual responses to similar targets. A theoretical analysis of factors which may be involved in tasks such as those used in these experiments was included. T. G. I. R 7

15, 233

Kincaid, W. M. & Hamilton, C. E. AN EXPERIMENTAL STUDY OF THE NATURE OF FORCED-CHOICE RESPONSES IN VISUAL DETECTION. Proj. MICHIGAN, Rep. 2144 295 T, Jan. 1959, 29pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

Hypotheses about the nature of forced-choice responses in visual detection were examined in this paper, and their predictions were tested. The hypotheses examined include 1) the psychophysical curve, 2) the fixed-criterion hypothesis, and 3) the decision-making hypothesis. Experimental principles are discussed, and results of experiments given. Theoretical implications are presented. T. G. R 13

15, 234

Kendler, H. H. LEARNING. Ann. Rev. Psychol., 1959, 10, 43-88. (New York University, New York, N. Y.).

This review covers the period from April, 1957 to April, 1958. The literature of learning theory and experimentation was reviewed as it related to the developing of theoretical formulations. Topics discussed include: 1) neobehaviorism and Stimulus-Response functionalism; motivation and learning, discrimination and generalization, retention and transfer, and an overview; 2) Skinner; 3) statistical learning theory; 4) cognitive theory; 5) intertheoretical differences; 6) miscellaneous; and 7) concluding remarks. R 204

15, 235

Jenkins, H. M. PERFORMANCE ON A VISUAL MONITORING TASK AS A FUNCTION OF THE RATE AT WHICH SIGNALS OCCUR. Tech. Rep. 47, Oct. 1953, 25pp. Massachusetts Institute of Technology, Cambridge, Mass.

To determine the effect of the rate at which signals are presented on performance in extended watches, three experiments were

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performed utilizing 191 subjects in a visual monitoring task in which the signal was an increase in the amplitude of deflection of an indicator needle. Performance as a function of signal rate (7.5-480 signals per hour) was measured in three ways: percentage of signals detected; incidence of false reports; and time required to respond to an obvious signal provided by onset of a pilot light. Results were submitted to chi square, plotted and discussed in terms of possible performance improvement. T. G. I. R 8

15, 236

Low, F.N. EFFECT OF SUPRATHRESHOLD CHANGES IN BRIGHTNESS ON FORM PERCEPTION. *Amer. J. Physiol.*, Dec. 1948, 155(3), 409-419. (Department of Anatomy, Johns Hopkins University School of Medicine, Baltimore, Md.).

To determine the effects of sudden supra-threshold diminution of brightness (from +1.2 to -1.6 log millilamberts) on peripheral form perception, 11 subjects responded as to presence, absence, and position of sets of four combinations of five Landolt circles. In a series of 12 experiments, angle deviation (30 to 45 degrees), test object size, test object contrast (27 to 97 percent), test object brightness (+1.2 to -1.6 millilamberts), and preparation of the subjects were manipulated. Interactions between variables are plotted. Results are discussed in terms of retinal structure and function. T. G. R 8

15, 237

Laboratorio di Fisiologia dell'Universita di Milano. INVESTIGATION OF THE FATIGUE IN MAN. FINAL REPORT. Contract AF 61(514) 637, AFOSR TR 58 117, ca. 1958, 8pp. Laboratorio di Fisiologia dell'Universita di Milano, Milan, Italy.

This is a condensed version of a study designed to determine the effects of stress on lower neuron activity. Total reflex times were obtained from spinal sensory and motor neurons as well as from supra-spinal centers, utilizing medical students (age 20-25 years). Results were reproduced utilizing animals. The reflex-time-data were attained under the following stress-inducing conditions: hypoglycaemia, hypoxia, physical exercise, sleeplessness, and high environmental temperature. The effects of 15 drugs such as acetylcholine, cortisone and ritalin were determined. Results are discussed.

15, 238

Poulton, E.C. ON READING AND VISUAL FATIGUE. *Amer. J. Psychol.*, Sept. 1958, 71(3), 609-610. (Applied Psychology Research Unit, MRC, Cambridge; England). (APU 337/58).

In this report, a "factual" error made by Carmichael and Dearborn in "Reading and Visual Fatigue," is discussed. The alleged

error concerns the correlation between fatigue from prolonged reading and eyelid blinks. The pertinent data from Carmichael and Dearborn is submitted to t test and discussed briefly in terms of blinking as a criterion of ocular fatigue. G. R 2

15, 239

Lindsley, D.B. (Proj. Dir.). RADAR OPERATOR "FATIGUE": THE EFFECT OF LENGTH AND REPETITION OF OPERATING PERIODS ON EFFICIENCY OF PERFORMANCE. Contract OEMSR 919, OSRD Rep. 3334 & Res. Rep. 6, Jan. 1944, 36pp. Applied Psychology Panel, NDRC, Camp Murphy, Fla. (Yerkes Laboratories of Primate Biology, Orange Park, Fla.).

To determine the effect of long and repeated periods of operation of an A-scan oscilloscope on performance efficiency on "fatigue effects", eight highly trained subjects, under simulated field conditions, were tested during four-hour periods of continuous scope operation on successive days for a period of approximately three weeks. Efficiency in detection of signals and accuracy in determining azimuth of target signals were measured as a function of operating periods and submitted to analysis of variance as well as graphic representation. Fatigue as a function of "echo" was also measured. Results are discussed. Three appendices contain additional material. T. G. I.

15, 240

Leonard, J.A. THE DISCRIMINABILITY OF SIMULATED VISUAL SIGNALS. ca. 1957, 5pp. Applied Psychology Research Unit, MRC, Cambridge, England.

To establish some of the factors making for ease or difficulty in discriminating amplitude-modulated signals displayed on a Cathode-Ray-Tube, subjects performed the following tasks in response to a simulated set of signals found on a probability basis: 1) a standard identification task, 2) sorting, 3) paced identification task, 4) paired-associates learning task, and 5) reconstruction of the stimulus on a physical model. Stimuli are metric histograms which are rendered randomly nonsensical by probability based variations in: complexity, redundancy, and noise. Results are discussed in terms of the applicability of easy nonsense symbols generated by probability models, as a tool for provision of visual "nonsense" material which can be graded on an a priori basis. R 7

15, 241

Leonard, J.A. TACTUAL CHOICE REACTIONS: I. *Quart. J. exp. Psychol.*, May 1959, XI(Part 2), 76-83. (Applied Psychology Research Unit, MRC, Cambridge, England). (APU 339/59).

15,242

To observe the effect of varying the number of alternatives on choice reaction time in a task having an initial high degree of compatibility, vibratory stimuli from relay armatures were presented to 1, 2, 4, or 8 fingers of eight subjects. The response was to depress the armature to the finger(s) stimulated. Reaction times were compared as a function of the amount and identity of the fingers stimulated. Errors in choice of response finger(s) were also recorded. Implications for further research are discussed. T. R 12

15,242

Honeyman, W.M., Cowper, M.C. & Yallop, J.M. EFFECTS OF ASYMMETRICAL POSITIONS OF AIRCRAFT CONTROLS INVESTIGATION WITH DIFFERENT TYPES OF CONTROL COLUMN. FPRC 656, Feb. 1946, 16pp. Flying Personnel Research Committee, London, England. (Psychological Test Research Section, Cambridge University, Cambridge, England).

To determine whether the effects of offset position on the use of aileron control and rudder depended on the type of column used, 18 experienced pilots were tested for errors in aileron control, hand control and rudder deviation under nine positional combinations of control column and rudder. Knowledge of error was presented to subjects on a cathode ray tube. Data were submitted to analysis of variance. Results are discussed in terms of previous experimental evidence and bomber versus fighter control columns. Detailed tables of results and illustrations of control columns are included in the appendix. T. I. R 1

15,244

Leonard, J.A. FIVE CHOICE SERIAL REACTION APPARATUS. APU 326, April 1959, 18pp. Applied Psychology Research Unit, MRC, Cambridge, England.

This paper describes an apparatus which has been used in experiments on environmental stress. The apparatus is designed for self-paced operation by both correct and error responses. Circuit details and descriptions of working parts of the whole circuit are given, together with plates and diagrams. Special notes are included for those building their own equipment. I.

15,245

Horst, P. RELATIONS AMONG m SETS OF VARIABLES. Contract NONR 477 (08), Public Health Research Grant M 743 (C4), Dec. 1959, 32pp. University of Washington, Seattle, Wash.

This article presents a "more efficient computational solution for the case of two sets of variables and a generalized solution for any number of sets." Applications of the method were discussed, and an example is

given to demonstrate the solution for more than two sets. T. R 8

15,246

Mechler, E.A., Russell, J.B. & Preston, M.G. THE BASIS FOR THE OPTIMUM AIDED-TRACKING TIME CONSTANT. J. Franklin Inst., Oct. 1949, 248(4), 327-334. (Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.).

This report presents evidence for the utility of an optimum aided tracking constant (0.2-0.8 seconds) for continuous velocity signals. The general mathematical formulae for aided tracking are developed and the relation between the optimum aided tracking time constant and interval between signals is discussed. G. I. R 5

15,247

Pepler, R.D. WARMTH AND PERFORMANCE: AN INVESTIGATION IN THE TROPICS. Ergonomics, Nov. 1958, 2(1), 63-88. (Applied Psychology Research Unit, MRC, Cambridge, England). (APU 284/58).

The effect of unusual levels of environmental warmth on the performance of skilled tasks by young European men living in the tropics was studied. Five experiments were performed: three on manual tracking, one on prolonged visual watchkeeping, one on high speed decision taking. The tracking was done at several temperatures (66-92 degrees F) with several handle loadings (8-32 lb.). The vigilance was done at 67, 82, and 92 degrees F. The decision task was done at 72, 81, 86, and 91 degrees F. These findings were compared to some obtained with artificially acclimatized men. T. G. I. R 11

15,248

Roth, E. SOME THEORETIC ASPECTS OF THE USE OF INERT GASES IN SEALED CABIN ENVIRONMENTS. Rep. 58 152, Nov. 1959, 18pp. USAF Aerospace Medical Center, Brooks AFB, Tex.

"The physical analysis of decompression bubbles within the body was reviewed in an attempt to provide a working model for selection of several inert gas combinations in sealed cabins. The maximum bubble size and symptom frequency after decompression appear to be proportional to a gas factor (solubility in oil² x diffusion coefficient in oil/solubility in water). "The inert gases--helium, neon, argon, krypton, xenon, and nitrogen--were compared with this relationship in mind. T. G. R 40

15,249

Morin, R.E., Grant, D.A. & Nystrom, C.O. TEMPORAL PREDICTIONS OF MOTION INFERRED FROM INTERMITTENTLY VIEWED LIGHT STIMULI. Contract AF 18(600) 54, RDO Proj. 694 49, WADC TR

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54 69, Jan. 1954, 14pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc.).

The accuracy of predicting when a moving object would reach a target was studied as a function of: velocity (.10 foot/second, .05 foot/second), interval between onset of successive cue lights (8 or 4 seconds), number of cue lights (2, 4), and distance for target from last cue light (2 or 4 ft.). Twenty-two subjects viewed the successive illumination of cue lights placed at even intervals in a horizontal row, then estimated the time it would take the imaginary object to reach target light by pressing button at predicted arrival time. For each of the 16 experimental conditions, three estimates were made by each subject. Analysis of variance technique was used. T. I. R 4

15, 250

Page, D. E. & Goldberg, I. A. HUMAN FACTORS EVALUATION OF A KEYSER ENTRY TECHNIQUE FOR FREQUENCY AND CHANNEL SELECTION. 1959, 16pp. International Telephone and Telegraph Laboratories, Nutley, N. J.

A keysetting device which was used for manually setting five-digit numbers was evaluated in terms of accuracy and time of operation. Five subjects operated the device under each of five experimental conditions: discrete pulsing, 2.1 digits/seconds, 3.4 digits/seconds, 5.6 digits/seconds, 12.8 digits/seconds. Keysetting errors and mean keysetting time were analyzed as well as the initial search and decision time. T. G. I.

15, 251

Poulton, E. C. TIME FOR READING AND MEMORY. Brit. J. Psychol., Aug. 1958, 49(3), 230-245. (Applied Psychology Research Unit, MRC, Cambridge, England). (APU 302/58).

To determine how comprehension was affected by "altering the speed of reading to the greatest feasible extent," 192 subjects were required to study series of statements, presented under various conditions. Tests of memory, recall, and recognition followed immediately; a delayed test of memory was given one week later. Two subsidiary questions were also investigated: Is it possible to learn as much by reading a part of the document carefully, as by reading it all more hurriedly? Is comprehension affected by the degree of rigidity of pacing while reading? T. G. R 15

15, 252

Kidd, J. S. A SUMMARY OF RESEARCH METHODS, OPERATOR CHARACTERISTICS, AND SYSTEM DESIGN SPECIFICATIONS BASED ON THE STUDY OF A SIMULATED RADAR AIR TRAFFIC CONTROL SYSTEM.

Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 59 236, July 1959, 29pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

This paper summarizes 14 major systems experiments concerned with relatively complex man-machine system operations, and carried out through the use of dynamic systems simulation. Results of the studies were presented in tabular form. Tentative generalizations are made regarding the following characteristics: 1) distribution of functions, and 2) procedural flexibility. Practical applications are made to problems of traffic load, procedures, and displays. Future trends are predicted. T. I. R 25

15, 253

Kidd, J. S. & Kinkade, R. G. OPERATOR CHANGE-OVER EFFECTS IN A COMPLEX TASK. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 59 235, Aug. 1959, 12pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Lab. of Aviation Psychology, Ohio State University & OSU Research Foundation, Columbus, Ohio).

To determine the effect of operator change-over and extended operational activity (i. e., a 3.5-hour work shift) and to determine the effect of prechange-over participation by a replacement operator on subsequent performance loss, 12 laboratory trained subjects performed in a simulated radar air traffic control system. At the moment of operator change-over, and for an extended operational period thereafter, performance was measured (in terms of system efficiency and safety). In the second phase, operator change-over efficiency (system efficiency and safety) was measured for the same 12 subjects as a function of the following levels of change-over operator participation: no participation, auditory participation, auditory plus visual participation, and parallel control. T. G. I. R 14

15, 254

Johnson, L. B. (Chm.). PROJECT MERCURY: MAN-IN-SPACE PROGRAM OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. Rep. 1014, Dec. 1959, 97pp. US Government Printing Office, Washington, D. C.

This is a report of a staff study, made to provide basic information on Project Mercury. Program descriptions are based on current program planning, and include history and organization of the Project, its relationship to manned space flight, the proposed arrangements and operation of the Mercury System, a description of the Project Mercury System, orbital flight

operations, biomedical progress, and selection and training of astronauts. Appendixes contain general references to space flight, biological and medical aspects, public impact of early satellite launchings and observations regarding manned space flight developments in USSR, and biographies of the astronauts. T. G. I. R 1

15, 255

Brandaleone, H. MEDICAL ASPECTS OF MOTOR-VEHICLE ACCIDENT PREVENTION IN INDUSTRY. J. Amer. med. Ass., Jan. 1957, 163(4), 237-239.

To determine the effects of a comprehensive medical program on motor-vehicle accident rate in industry, the following program was undertaken in two companies: 1) the establishment of rigid preplacement, driver-selection examinations; 2) periodic medical examinations of operators; and 3) a comprehensive medical program for employees. Comparisons are made with previous years and the year of the establishment of this program in terms of accident rate, absenteeism, financial loss due to accidents. The results are discussed in terms of the human factor in motor-vehicle accidents and recommendations of the Industrial Medical Association are included. T. R 7

15, 256

Elliott, H. NEUROLOGICAL AND NEUROSURGICAL ASPECTS OF TRAFFIC ACCIDENTS. J. Amer. med. Ass., Jan. 1957, 163(4), 242-245.

This article contains a review of neurological and neurosurgical aspects of injuries resulting from traffic accidents with special emphasis on injuries resulting in death. The following aspects are discussed (with recommendations included): incidence, mechanisms, multiplicity, and variability of head injuries; community "death traps"; first aid and ambulance transportation; and extent of alcohol intoxication and aspects of drug usage. T. G.

15, 258

Braunstein, P. W. MEDICAL ASPECTS OF AUTOMOTIVE CRASH INJURY RESEARCH. J. Amer. med. Ass., Jan. 1957, 163(4), 249-255.

To determine the medical findings which can be expected in the 1,000,000 persons injured by automobile injuries each year, a sample of 1000 injury-producing accidents were studied utilizing data attained from various agencies in ten states. Injuries were divided as to severity level into: minor, moderate, severe, serious, critical and fatal. Each level of injury was analyzed as to causation and area or areas of the body

where the injuries were sustained. Recommendations are made for an epidemiologic approach to crash injuries. T. I. R 8

15, 259

Winternitz, M. C. (Chm.). SYMPOSIUM ON STRESS (16-18 MARCH 1953). March 1953, 332pp. USA Medical Service Graduate School, Walter Reed Army Medical Center, Washington, D. C.

Some of the topics covered were: visceral circulation on homeostasis, metabolic responses in acute and chronic stress situations, the pituitary-adrenocortical system in stress situations, stress in the combat zone, psychological reactions in stress situations, group behavior in stress situations, cultural perspectives on stress, experimental evocation of stress, influence of drugs on stress states, implications of stress in psychological warfare, etc. T. G. I. R 255

15, 261

Smith, A. A. & Boyes, G. E. AMBIENT ILLUMINATION AND PERSISTENCE OF TARGETS ON RADAR DISPLAYS EMPLOYING MAGNESIUM FLUORIDE PHOSPHORS. DRML Proj. 163 & PCC Proj. D77 94 20 22, DRML Rep. 163 13 & HR 133, Nov. 1957, 5pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

The effect of ambient illumination on the visibility of small radar targets at decay times of 0, 12, and 24 seconds was studied. Three levels of ambient illumination—darkness, 0.1, and 0.5 foot-candles—were used. Ten subjects participated. Analysis of variance was performed on the thresholds. T. G. R 2

15, 262

Stockbridge, H. C. W. MICRO-SHAPE-CODED KNOBS FOR POST OFFICE KEYS. Tech. Memo. 67, March 1957, 4pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

This study was aimed at designing and selecting a set of small, shape-coded knobs suitable for Post Office type keys. Seven knobs were presented to each of 14 male subjects for identification after an initial practice. Successes and errors are interpreted in terms of discriminability of knobs. T. I. R 4

15, 263

Mornat, G. M. AGE-HEIGHT-WEIGHT STANDARDS SUITABLE FOR USE IN MEDICAL EXAMINATIONS OF AIRCREW CANDIDATES. FPRC 653, Feb. 1946, 3pp. Flying Personnel Research Committee, London, England.

This is primarily an age-height-weight table based on two surveys of RAF aircrew during which 14,000 were measured. Each

cell gives average weight plus the range of weights for that age and height as represented by the 1st and 99th percentiles. This table replaces a much earlier one based on civilian population done by life insurance companies; it is more realistic for use in medical examinations of aircrew men. T. R 2

15, 265

Jerger, J. F. CUMULATIVE AUDITORY FATIGUE. Rep. 58 46, March 1958, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

This study explored the cumulative auditory fatigue phenomenon by measuring these effects induced by three successive one-minute fatiguing stimuli of different intensities. Six one-hour sessions were run on each of 26 subjects, using six fatiguing intensities—85, 90, 95, 100, 105, and 110 db.—in random sequence. Cumulative fatigue was defined as the difference between threshold recovery time after the first fatiguing tone and that after the third tone. Rank-order correlation coefficients were computed for the different intensities. Other analyses were also made. T. G. I. R 8

15, 266

Hick, W. E. AN ASPECT OF SEARCHING WITH BINOCULARS. APU 140/50, Sept. 1950, 5pp. The Psychological Laboratory, MRC, Cambridge, England.

The efficiency of searching for a small object with binoculars using both eyes was compared to searching with one eye with the view toward a proposed modification of binoculars. Six subjects performed searches with the object at each of five positions on a screen. The object subtended 10.6 minutes of arc, as seen through binoculars. Search times were analyzed. T. G. I.

15, 267

Charipper, B. A. SHIP CONTROL VIII SINGLE-ELEMENT VS. TWO-ELEMENT DISPLAY IN TWO-DIMENSIONAL TRACKING. Contract NONR 2512(00), Proj. SUBIC, P59 009, Electric Boat Tech. Rep. SPD 59 003, Feb. 1959, 7pp. General Dynamics Corporation, Groton, Conn.

Tracking performance of 60 male naval officers using a single-element display was compared to that using a two-element display. The tracking task was submarine course-keeping and depth-keeping; the controls were joy-stick, wheel and slide, and wheelstick. The data were analyzed as a function of display and controls. T. G. I.

15, 268

Barnard, C. R. A METHOD OF INCREASING THE AMBIENT ILLUMINATION OF RADAR OPERATIONS ROOMS WITHOUT REDUCTION OF SIGNAL DETECTION THRESHOLD. Tech. Note RAD 619, Sept.

1955, 13pp. Royal Aircraft Establishment, Farnborough, Hants, England.

An experimental installation of radar consoles equipped with narrow band filters in a room with ambient lighting was evaluated in terms of signal detectability. This performance was compared to that on an unfiltered console in an unlighted room to determine whether the new system was acceptable. G. R 3

15, 269

USA Personnel Research Section. REPORT ON COMPARISON OF THREE VISUAL ACUITY TESTS. PRS Rep. 249, Feb. 1942, 3pp. USA Personnel Research Section, Washington, D. C.

This report compares the scores of about 395 men on the Snellen, Broken Circle #1 and #2, Shortened Circle, and AAA acuity tests. Intercorrelations were obtained mainly between the Snellen and Broken Circle #1 and #2 scores. The results are described in terms of reliability as well as relationship among the tests. T.

15, 270

Wescott, M. F. & Ott, E. R. RESEARCH IN QUALITY CONTROL. Contract NONR 404(11), Task NR 042 021, Tech. Rep. 2, Aug. 1958, 11pp. Rutgers University, New Brunswick, N. J.

The concepts of research and quality control are examined in their broad and narrow interpretations. Then the concept of research in quality control is delineated and discussed in general terms. Recommendations for support of such research are made. T. R 3

15, 272

Weis, E. G., Jr., Marko, A., McLennan M. A. & Correll, E. G. DEVELOPMENT OF AN OXYGEN PARTIAL PRESSURE TRANSDUCER. Proj. 7222, Task 71751, WADC TN 59 395, Nov. 1959, 15pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

This investigation was aimed at establishing a method for monitoring the oxygen supply of man during stress experiments. The requirements for such a method were stated, and a review of various systems was made. The polarographic principle was thus selected and examined in detail. G. I. R 9

15, 273

Waters, L. K. & Wherry, R. J., Jr. FACTOR ANALYSIS OF SELECTION TESTS AND PERFORMANCE MEASURES IN U.S. NAVAL SCHOOL PRE-FLIGHT. Proj. MR005.13 3003, Subtask 10, Rep. 2, Aug. 1959, 11pp. USN School of Aviation Medicine, Naval Air Station, Fla.

"A 19 variable matrix representing the relations among selection test total and sub-scale scores, course performance in US Naval School, Pre-Flight, and a peer

rating of officer potential was factor analyzed." These data were collected from 336 cadets. Six factors were obtained from the matrix based on variables loading .35 or greater. In addition correlations were obtained between selected predictors and pre-flight technical courses, and some recommendations made regarding the use of these scores as predictors. T. R 5

15, 274

Woellner, R.C. & Graybiel, A. THE LOSS OF COUNTER-ROLLING OF THE EYES IN THREE PERSONS PRESUMABLY WITHOUT FUNCTIONAL OTOLITH ORGANS. Proj. MR005.13 6001, Subtask 1, Rep. 50, Dec. 1959, 8pp. USN School of Aviation Medicine, Naval Air Station, Fla.

On three totally deaf subjects ocular torsion was measured when the subject was tilted or exposed to centripetal force. This procedure was arranged to ensure only otolith stimulation. Counter-rolling was determined by comparative measurements of the position of the eye made from photographs of the face before, during, and after each procedure. Several angles of tilt were tested. These records were compared to those of normal subjects by the F test. T. G. R 10

15, 275

Van Cott, H.P. HUMAN ENGINEERING METHODS FOR SYSTEM DEVELOPMENT. Paper 58 A 239, Sept. 1958, 5pp. American Society of Mechanical Engineers, New York, N.Y.

This article briefly describes the beginning of human engineering, its relation to engineering, and two of its methods: system function analysis and task analysis. I. R 2

15, 276

Sydiaha, D. ON THE EQUIVALENCE OF CLINICAL AND STATISTICAL METHODS. J. appl. Psychol., 1959, 43(6), 395-401. (University of Saskatchewan, Saskatoon, Canada).

This paper compares linear statistical and clinical methods of personnel assessment with respect to: a) correlation with interview decisions, b) correlation between models, and c) errors of measurement. Eight interviewers assessed from 14 to 50 Canadian Army applicants using biographical, test, and interview information. The assessment consisted of a 120-item Q-sort check list. These data were quantified into statistical and clinical scores, and the aforementioned correlations computed. T. R 7

15, 277

Shaw, W.J. OBJECTIVE MEASUREMENT OF DRIVING SKILL. International Road Safety and Traffic Rev., Autumn 1957,

10(1), 37-39. (Applied Psychology Research Unit, MRC, Cambridge, England).

This paper covers specifically the driver variables which make for safe driving or for accidents. The research in this area has used two approaches: the statistical approach in which large numbers of accidents are examined to establish causal relationships, and the experimental approach in which some physiological or psychological attribute of the person is related to some criterion of driving ability. Some accident surveys and experimental techniques are briefly covered. G.

15, 278

Schutzenberger, M.P. & Marcus, R.S. FULL DECODABLE CODE-WORD SETS. IRE Transactions, IT-5(1), March 1959, 12-15.

This paper considers how the decodability condition imposes restrictions on a set of code words. A generating function that describes the composition of the code words is defined, and the relation between this function and a "full" set of code words is found. R 8

15, 279

Rubinstein, I. SOME FACTORS IN PROBABILITY MATCHING. J. exp. Psychol., June 1959, 57(6), 413-416. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.).

An experiment on probability matching was performed to determine how an optimal solution is achieved. In group A, two differently colored cards were presented randomly with the restriction that blue occurred 67 percent and yellow 33 percent of the time. In group B, the same cards were used except three different color cards were used where only yellow was. In the third group, three cards were used—they were shuffled before each trial. These predictions were subjected to median tests and χ^2 . T. G. R 7

15, 281

Ott, E.R. ANALYSIS OF MEANS. Contract NONR 404(11) Task NR 042 021, Tech. Rep. 1, Aug. 1958, 29pp. Rutgers University, New Brunswick, N.J.

The methods of statistical analysis described in this paper are an extension of Shewhart control chart techniques. These procedures compare directly the differences between means instead of the variance ratios. The two methods are: that which holds constant all suspected sources of variability and that which varies different factors suspected of contributing to variation in a predetermined way. The major section of the paper is devoted

to presenting in detail the procedure, analysis of means. Several examples of using this method are also included. T. I. R 25

15,282

Johnson, R. A. MODEL 16 AUTOMATIC BLOOD PRESSURE MEASURING INSTRUMENT. Contract AF 33(616) 5829, Proj. 7164, Task 71832, WADC TR 59 429, Dec. 1959, 45pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

The development of an instrumentation system to automatically monitor human blood pressure and provide an electrical signal that can be automatically recorded or telemetered is described in detail. The aim of this program was to develop an indirect method of measuring blood pressure by the alternate occlusion and patency of an artery by some passive pressure applied directly over the artery. The device is capable of providing physiological information about pilots while they are flying research aircraft. T. G. I.

15,283

Hitt, W. D. QUANTITATIVE METHODS IN APPLIED PSYCHOLOGY. Dec. 1958, 8pp. Battelle Memorial Institute, Columbus, Ohio.

This article reviews the quantitative methods used by research psychologists and points up some of the problems to which these methods may be applied. Psychophysics, psychological scaling methods, analysis of variance, correlation analysis and prediction, factor analysis and a few other techniques are included. G.

15,285

Ely, J. H. DATA COLLECTION FOR THE DESIGN AND EVALUATION OF MAN-MACHINE SYSTEMS. 58 A 241, Dec. 1958, 4pp. American Society of Mechanical Engineers, New York, N. Y.

This article discusses some of the most important considerations in the collection of data on human performance in man-machine systems in non-laboratory situations. Some of these include: establishing system requirements, selecting the population, repeating measurements, objective vs. subjective data, special techniques for data collection.

15,286

Coombs, C. H. PSYCHOLOGICAL MEASUREMENT AND A THEORY OF DATA. Proj. MICHIGAN, Rep. 2900 23 T, Sept. 1959, 29pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

"The theory of data is a mathematical model which provides a foundation for psychological measurement and leads to a simple classification of models and the study of their

interrelations." This theory is formally developed—it characterizes data in terms of three basic dichotomies and classifies models in abstract terms in eight categories. The mathematical character of these models is discussed and examples of data indicated. T. I. R 56

15,287

Dale, H. C. A. A FIELD STUDY OF FAULT-FINDING IN WIRELESS EQUIPMENT. APU 329/58, March 1958, 18pp. Applied Psychology Research Unit, MRC, Cambridge, England.

The following questions about fault-finders for C 42 wireless equipment were investigated: how do they work; is the difference in their methods related to their fundamental knowledge, practical experience or familiarity with the equipment; what are the characteristics of an efficient procedure? Fifteen experienced persons were observed while attempting to locate a fault which had been deliberately inserted in the wireless equipment. Objective records, introspection and impressions were obtained from each subject. A general strategy based on the individual methods is recommended. T. I. R 5

15,288

Dale, H. C. A. ON THE NATURE OF FAULT-FINDING IN ELECTRONIC EQUIPMENT. APU 328/58, March 1958, 7pp. Applied Psychology Research Unit, MRC, Cambridge, England.

This theoretical paper describes the task of fault-finding and some psychological problems related to it. General methods of testing equipment and the efforts involved are indicated. The choice of strategy is then discussed in terms of economy of time and effort. R 7

15,289

deRivera, J. THE POSTURAL SWAY TEST AND ITS CORRELATIONS. Res. Proj. MR005 13 3001, Subtask 7, Rep. 3, Nov. 1959, 31pp. USN School of Aviation Medicine, Naval Air Station, Fla.

The relationship between the postural sway test and preflight navigation grades and flight grades was studied in several separate experiments. In one, swayers and non-swayers were compared for anxiety as well as the aforementioned grades. In another they were compared for their memorizing ability on meaningful and meaningless relationships. In another, several measurements were obtained by the sway test on a group that was informed about the test and one that was uninformed. Also questionnaires were administered to some subjects. T. R 15

15, 291

15, 291

Davis, J. F. MANUAL OF SURFACE ELECTROMYOGRAPHY. Proj. 7184, Task 71580, WADC TR 59 184, 122pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (McGill University, Montreal, Canada).

The methodology and instrumentation of surface electromyography (EMG) are presented. Principles (and their applications) of electrode placement, and standard placements, are given. Varieties of ink-writing EMG's are evaluated and specifications for a satisfactory research instrument are discussed in terms of: type of power supply, type of recorder, and desirable characteristics for pre-amplification, main amplification and laboratory construction to minimize artifacts. Finally operations of EMG's are discussed in terms of: methods of eliminating artifacts, and measurement of primary and integrated records. Illustrations are provided. T. G. I. R 15

15, 292

Briggs, G. E. & Howell, W. C. ON THE RELATIVE IMPORTANCE OF TIME SHARING AT CENTRAL AND PERIPHERAL LEVELS. Contract N61339 508, Tech. Rep. NAVTRADEVCE 508 2, Oct. 1959, 14pp. USN Training Device Center, Port Washington, N. Y.

This study investigated the acquisition of skill in a two-dimensional tracking task as a function of the amount of peripheral time sharing (alternate eye fixation between information display). Six subjects performed the tracking task under conditions where the rate of information presented on the two displays varied and where the distance between the two displays also varied. Data were analyzed by means of analysis of variance. Central and peripheral time sharing are discussed. T. G. I. R 14

15, 293

Brady, J. V. THE PALEOCORTEX AND BEHAVIORAL MOTIVATION. WRAIR 30 56, Jan. 1956, 48pp. USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D. C.

Anatomical characteristics of the paleocortex and related structures are considered with special emphasis upon their morphological and functional properties. Reviewed are the behavioral observations following paleocortical injury in order to evaluate the suggestion that there is a relationship between these structures and behavioral motivation. Included is a summary of recent work at the Walter Reed Army Institute of Research concerned specifically with emotional behavior and its neural correlates. T. G. I. R 139

15, 294

Briggs, G. E. & Wiener, E. L. FIDELITY OF SIMULATION: I. TIME SHARING REQUIREMENTS AND CONTROL LOADING AS FACTORS IN TRANSFER OF TRAINING. Contract N61339 508, Tech. Rep. NAVTRADEVCE 508 4, Oct. 1959, 12pp. USN Training Device Center, Port Washington, N. Y. (Ohio State University, Columbus, Ohio).

To determine the effect that fidelity of simulation (degree of control loading) of a training device has on transfer of learning as a function of the complexity of the task, 48 undergraduates performed in a two-dimensional control task which simulated an operational interceptor aircraft. Transfer of training was measured as a function of: control loading (spring stiffness present in a control column) and peripheral time-sharing requirements (number of simultaneous dimensions of control required). Each subject received 24 (40-second) training trials followed by eight (40-second) transfer trials. The results are plotted and subjected to analysis of variance. Implications and recommendations are in terms of optimum high fidelity of control loading. T. G. R 5

15, 295

Gottsdanker, R. REACTION TIME: THE TIME TO INITIATE A RESPONSE. MH Aero Doc. U ED 6102, Dec. 1958, 13pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

This paper reviews experimental studies of reaction time (RT), especially as they concern categories of uncertainty which prevent the synchronization of response with signal. Categories which have been subjected to experiment and for which there are some "solid conclusions", and categories which at present are only possibilities for investigation both were discussed. The uncertainties discussed were: Temporal, Signal-Region, Response, Discriminal, Competitive, Option, Translation, and Encoding-Decoding Uncertainty. Other variables affecting RT were discussed briefly. R 29

15, 296

Gottsdanker, R. THE INTRINSIC ACCURACY AFFORDED BY THE OPERATOR'S MOVEMENTS. MH Aero Doc. U ED 6122, May 1959, 17pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

This report reviews two general kinds of research devoted to investigating the intrinsic accuracy afforded by operator movements with special emphasis on performance at airplane control boards without visual error feed back. The first type of research

involves production of some physical extent (displacement, force, etc.) and the second concerns discrimination through "kines-thetic recognition". Variables are con-sidered, such as direction and unit of response, and others. Indices of performance are dis-cussed with emphasis on statistical analysis of response data. Previous experimental re-search in both areas is considered and evaluated. R 22

15, 297

Gottsdanker, R. & Senders, J.W. COMPATIBILITY OF DISPLAY AND CON-TROL. MH Aero Doc. U ED 6109, Feb. 1959, 14pp. Minneapolis-Honeywell Reg-ulator Company, Minneapolis, Minn.

The advantages of having displays and controls which work well in combinations where the operator is working under pres-sure of time were discussed. The material was organized in terms of 1) static problems (isomorphic or non-isomorphic display and control panels, extent of correlation in the two panels, and isomorphic relations vs. situations with non-spatial differentials), and 2) mechanical problems (axial and/or rotary motions of pointer and control).

I. R 29

15, 298

Gottsdanker, R. & Senders, J.W. REACTIONS TO SEQUENCES OF SIGNALS. MH Aero Doc. U ED 6108, Feb. 1959, 10pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

This paper discusses research on the problem of reactions to sequences of signals. The research is discussed under two broad classes: those situations in which the subject is required to respond individually to each of two signals which occur in rapid succession, and those situations requiring response to each of a train of signals. Re-sponse to irregularly spaced signals from several sources, and to simultaneous signals from different sources are also discussed. R 25

15, 299

Gottsdanker, R. THE SPEED AND ACCURACY OF DISCRETE ADJUSTMENTS. MH Aero Doc. U ED 6132, Aug. 1959, 21pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

This article reviews research, delineates problems, and suggests method-ology for the investigation of the speed and accuracy of discrete adjustments. Elements discussed are: the components of compound cycles of motion; the patterning of simple motion; and factors in the effectiveness of operation. Comparative functions are in-cluded concerning the relation between dis-tance and duration (extracted from three

studies). Mathematical constructs are included when appropriate. G. R 50

15, 300.

Gottsdanker, R. THE ROLE OF PHYSI-CAL LIMITS IN MOTOR SKILLS. MH Aero Doc. U ED 6130, Aug. 1959, 13pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

This report investigates the role of physical limits in motor skills with emphasis on the reach, strength and speed involved in the operation of controls. Evaluation and recommendations are made as to the limits of reach and strength with supporting norma-tive and comparative data. Speed of move-ment is discussed in terms of reciprocal motion and cranking with a consideration of reasonable limits. R 31

15, 301

Huntington, Jane M. SELECTED BIB-LIOGRAPHY OF HUMAN FACTORS RE-PORTS. MH Aero Doc. U ED 6147, Nov. 1959, 21pp. Minneapolis-Honeywell Regula-tor Company, Minneapolis, Minn.

This is an annotated bibliography (ap-parently from Minneapolis Honeywell) of staff Memo's and reports on human factors research. The bibliography covers a fairly wide range of topics (e.g., Proposed Ship Control Study, On the Detection of Hypoxia, Research for Basic Information on Dial De-sign). Some titles are classified, a few are reported by title only, without annotation. R 50 (approx.)

15, 302

Kinkade, R.G. AUGMENTED FEED-BACK AND TRACKING SKILL. Contract N61339 508, NAVTRADEVCE 508 3, Oct. 1959, 27pp. USN Training Device Center, Port Washington, N.Y. (Ohio State Uni-versity, Columbus, Ohio).

Three interrelated studies were per-formed on the acquisition and transfer of skill as a function of augmented feedback (feedback information to an operator in addition to that provided by the "skill" task itself). Subjects (196) performed a continuous tracking task in which auditory clicks occurred twice per second when operator was on target. In the first study tracking skill acquisition was studied as a function of relative amount of augmented feedback; the second study was the same with the addition of the schedule of augmented feedback as an independent variable; the third study investigated tracking performance as a function of transfer from a condition which provided amounts of augmented feedback ranging from absence to a large amount. Results are discussed and implications considered. T. G. R 12

15, 303

15, 303

Silver, C.A. (Proj. Engr.). ANALYSIS OF HUMAN CAPABILITY IN CONTROL TASKS. MH Aero Doc. U ED 6140, Nov. 1959, 15pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

This paper contains: 1) an analysis of combat mission time sequence of events, based on interviews with fighter pilots, and other sources; 2) brief descriptions of seven major factors affecting human performance in a Man-Machine System: Reaction Time, Compatibility of Display and Control, Reactions to Sequences of Signals, The Intrinsic Accuracy Afforded by the Operator's Movements, The Role of Physical Limits in Motor Skills, The Speed and Accuracy of Discrete Adjustments, and Tracking and Control of Complex Systems; 3) a description of the literature search initiated to obtain information in these seven areas. R 49

15, 304

Silver, C.A. (Proj. Engr.). DOCUMENTATION INDEX AND BIBLIOGRAPHY FOR STUDY ON HUMAN ENGINEERING OF CONTROL SYSTEMS. MH Aero Rep. 1508 TR1, Nov. 1959, 41pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

This bibliography includes titles which can be indexed as follows: 1) Analysis of Human Capability in Control Tasks: a) Task Analysis -- information presented to pilot, interpretation made by him, information demanded of him, and b) State-of-the-Art-Survey--major factors affecting human performance in Man-Machine Systems; 2) Human Factor Dynamics in Control System Design: a) Reaction Time, b) Display-Control Compatibility, c) Reaction to Sequences of Signals, d) Intrinsic Accuracy Afforded by Operator's Movements, e) Physical Limits in Motor Skills, f) Speed and Accuracy of Discrete Adjustments, g) Tracking Behavior, and h) Application of Human Dynamics Data; and 3) Layout of Cockpit Displays and Controls. R 356

15, 305

Senders, J.W. & Leonard, T.E. AN APPLICATION OF HUMAN DYNAMICS DATA. THE ESTABLISHMENT OF OPTIMUM LINEAR DYNAMICS FOR PILOTED AIRCRAFT BY THE MINIMIZING OF MEAN SQUARE TRACKING ERROR. MH Aero Doc. R ED 6125, June 1959, 33pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

"This report describes the use of the minimum mean square error criterion in establishing linear machine dynamics best suited for human control. Methods are developed for predicting quasi-linear human behavior and for calculating mean square tracking error. Optimum linear dynamics

for a piloted aircraft in a typical tracking task are determined." T. G. I. R 11

15, 306

Silver, C.A. (Proj. Engr.). LAYOUT OF COCKPIT DISPLAYS AND CONTROLS. MH Aero Doc. U ED 6139, Nov. 1959, 27pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

Cockpit organization was discussed as it affects optimum display of information required by the pilot for normal, standby, and emergency operation. The necessity for optimum arrangement with as little transitional interference from experience with present to new and more complex types of aircraft was considered. Recommended placement is given for each of ten functional areas and for placement of displays and controls within these areas. G. I.

15, 307

Shackel, B. A NOTE ON PANEL LAYOUT FOR NUMBERS OF IDENTICAL ITEMS. Ergonomics, May 1959, 2(3), 247-253. (E.M.I Electronics Ltd., Hayes, Middlesex, England).

Two brief tests were reported in which the operator's task was the sequential selection of two items from two groups of twenty-four items. A total of ten subjects was used, chosen to be representative, in intelligence level and prior training of persons likely to use analog computers and similar machines. Differences between two layouts were discussed with reference to the question whether the spatial layout best for a small number of similar items on a panel also is best when extended to a large number of items. T. I. R 3

15, 308

Senders, J.W. HUMAN TRACKING BEHAVIOR. MH Aero Doc. U ED 6141, Nov. 1959, 37pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

Research concerning variables involved in the establishment of optimum man-machine interaction in airplane display tracking is reviewed and recommendations are given. Considerations include display (modality, size, area, amplitude of motion, brightness, and pursuit and compensatory presentation); the man (human dynamics and training); the control (feel, sensitivity, and miscellaneous characteristics); intermittency; controlled element (delay and aided quickening); and a summary and conclusions. A manual tracking system is illustrated.

15, 309

Shackel, B. MACHINE DESIGN FOR SAFETY. Paper presented to the National Industrial Safety Conference Scarborough May 8th - 10th, 1959, EM1 Psychol. Rep.

IV 303

53, 1959, 20pp. Royal Society for the Prevention of Accidents, London, England.

This report contains a general discussion of some aspects of machine design for safety. Emphasis is on safe usage, the need for feedback, safe design and practicing at design for safety at all levels. Recommendations are given for achieving optimum machine design for safety. R 5

15, 310

Saul, E.V. (Princ. Investigator). HUMAN ENGINEERING BIBLIOGRAPHY 1957-1958. Contract NONR 494(13), ONR Rep. ACR 43, Oct. 1959, 298pp. USN Office of Naval Research, Washington, D.C. (Human Engineering Information and Analysis Service, Tufts University, Medford, Mass.).

This bibliography, one of a series of annual bibliographies, provides abstracts of literature pertinent to human factors research. Instructions for and illustrations of use are given for the bibliography, which is divided into five parts: 1) Topical Outline of the Literature in Human Engineering, which includes over 300 topics, 2) Facsimile of Subject Matter Files, 3) Alphabetical Index to the Human Engineering Literature, 4) Citations and Abstracts, and 5) Author Index. R 1630 (approx.)

15, 311

Webb, S. & Coburn, R. DEVELOPMENT AND TESTING OF A HAND-CONFIGURED KEYSSET. NE 09130 4, Tech. Memo. TM 357, Sept. 1959, 9pp. USN Electronics Lab., San Diego, Calif.

In order to evaluate and list a 16-button keyset, six college students performed on each of two experimental keysets. Time required, errors and subject preference were recorded. In terms of these measurements, an experimental "hand-configured" keyset was compared with a static configured keyset. Results were analyzed by t test and discussed in terms of improvements of communication between an operator, his display, and a computer-aided data processing equipment. Illustrations of the two keysets are included. T. 1.

15, 312

Shapero, A. & Bates, C., Jr. A METHOD FOR PERFORMING HUMAN ENGINEERING ANALYSIS OF WEAPON SYSTEMS. Contract AF 33(616) 5688, Proj. 8(8 7192) & SRI Proj. 1U 2568, Task 71838, WADC TR 59 784, Sept. 1959, 68pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Stanford Research Institute, Menlo Park, Calif.).

This report described a weapon system analysis and integration model which was developed to include the system's

human elements, and which could be employed as an aid in "analysis, synthesis, evaluation, planning, and management control of weapon systems." A section devoted to using the model describes how it provides "a way for the systems analyst of the systems manager to maintain an integrated overview of a system and to include and contain changes and developments as they appear." I. R 2

15, 313

Parker, J.F., Jr. & Fleishman, E.A. PREDICTION OF ADVANCED LEVELS OF PROFICIENCY IN A COMPLEX TRACKING TASK. Contract AF 41(657) 64, Proj. 1710, Task 71605, WADC TR 59 255, Dec. 1959, 57pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Psychological Research Associates, Inc., Austin, Tex. & Yale University, New Haven, Conn.).

To investigate relationships between ability variables and progress in learning a complex perceptual-motor skill, to specify the abilities underlying terminal proficiency on a complex control task, and to investigate the way in which the contribution of these abilities to proficiency change over time, 203 subjects were given a large battery of printed tests and psychomotor apparatus. Five performance measures were obtained for each subject. All test scores and criterion (task) measures were transformed into stanines, and intercorrelations obtained between the measures. The matrix of intercorrelations was factor analyzed, and 15 ability factors identified. The authors pointed out relevance of the findings for learning of complex skills, problems in training, and in test development.

T. I. R 23

15, 314

Graybiel, A., Holmes, R.H., Beischer, D.E., Champlin, G.E., et al. AN ACCOUNT OF EXPERIMENTS IN WHICH TWO MONKEYS WERE RECOVERED UNHARMED AFTER BALLISTIC SPACE FLIGHT. Aerospace Med., Dec. 1959, 30, 871-931. (USA Ordnance Missile Command, Huntsville, Ala. & USN School of Aviation Medicine, Naval Air Station, Fla.).

This is a detailed report of two experiments in which three monkeys were carried 300 miles into space in Jupiter missiles. Details were furnished concerning construction of the biocapsules, provisions for a closed life support environment, equipment used and arrangements for monitoring responses. Experimental findings were presented and impressions were given which related to difficulties encountered in this work and of further work needed before humans can be put into space. T. G. I. R 13

15, 316

15, 316

Campbell, J. W. & Blank, H. E., Jr. EXPERIMENTAL RADAR DATA COMPUTER. Marine News, Dec. 1959, 4pp. (Dunlap and Associates, Inc., Stamford, Conn.).

This paper discusses the need for improved methods of processing radar data, especially in situations where a ship's watch officer may be heavily loaded with work and failure to use available radar information or misinterpretation of radar data results. Plans for a prototype experimental radar data computer are presented, and the potential values of such a computer are discussed. I.

15, 317

Backlund, F. THE POSSIBILITY OF MEASURING SATIATION. Rep. 6, May 1959, 16pp. University of Uppsala, Uppsala, Sweden.

Using previous investigations of the strength of the influence that a figure has on its field, the experiments described in this paper were undertaken to quantify satiation as an aspect of figural after-effect. Four experiments were described: in the first a procedure used previously by Nozava was used in slightly modified form; the second experiment repeated one of Nozava's experiments, the third introduced modifications into the methods used in the second, and the fourth was carried out with both increasing and decreasing variable stimulus. Results are discussed as they relate to those obtained in other studies. T. I. R 11

15, 319

Richardson, B. B. TEN COMMANDMENTS FOR DESIGN RELIABILITY. Human Factors Bull. 60 2H, 1960, 1pp. Flight Safety Foundation Inc., New York, N. Y.

This brief bulletin states and discusses ten commandments for reliability of system design. Such factors as mechanical simplicity, provision for minimum vital human functions, and for liberal performance margins are included. R 1

15, 322

Gerathewohl, S. S. & Haber, H. A STUDY OF RUNWAY MARKINGS. Proj. 21 02 007, Rep. 2, April 1949, 1-2. USAF School of Aviation Medicine, Randolph AFB, Tex.

To study the chevron as an aircraft runway marking, two experiments were conducted. Five chevrons differing as to their angle (30, 60, 90, 120, and 150 degrees) were studied by means of a fog simulator to select the most efficient angle. In the second study, the effect of perspective distortion on the appearance of the chevron was studied by means of a changeable angle. The subjects had to form an angle of 60 degrees by free judgment (with a paper model for comparison) while viewing the apparatus both vertically and at a three degree angle. On the basis of this and one previous study a Runway Marking Plan was designed. G.

15, 323

Gerathewohl, S. S. & Haber, H. A PROPOSED RUNWAY IDENTIFICATION LIGHTING SYSTEM. Proj. 21 02 007, Rep. 3, April 1949, 5-6. USAF School of Aviation Medicine, Randolph AFB, Tex.

A Runway Identification Lighting System is described which converts the daylight marking previously described (15, 322) into a self-luminous pattern. Advantages of this system of runway identification are discussed.

PART V AUTHOR INDEX

The Author Index, which appears on the immediately succeeding pages, permits the retrieval of references produced by specific authors. The Accession Numbers following each author should be searched in Part IV. In general, all authors of a publication are listed in the Author Index. However, in some rare instances where a large number of authors contributed to a single work, only the first four authors have been listed in both the citation and the Author Index.

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